ABSTRACT

Title of Dissertation:	Measurement of self-regulatory constructs across a continuum of performance conditions among kindergarten students Lee Ann Annotti, Doctorate of Philosophy, 2013
Directed By:	Professor Hedwig Teglasi Department of Counseling, Higher Education, and Special Education

Measurement issues related to the assessment of Executive Functioning (EF) and social competence were examined with Kindergarten students (N = 62) and their teachers. Measures of constructs, such as EF and social competence, exist along a continuum of performance conditions, ranging from highly maximal, well-defined tasks with clear performance expectations to more typical, ill-defined tasks with ambiguous performance expectations. It is hypothesized that measures with maximal or typical performance conditions cannot be used interchangeably because the results gleaned from the measures generalize to different situations and different behaviors. This study employed observed variable path analyses to examine the model fit between measures of EF and social competence that present performance conditions that range from maximal to typical. The results indicate that performance conditions of measures significantly alter the relations between measures and the results gleaned from the opposing performance conditions predict different behaviors in different contexts. The results also suggest that more maximal measures of EF do not translate to the social world.

MEASUREMENT OF SELF-REGULATORY CONSTRUCTS ACROSS A CONTINUUM OF PERFROMANCE CONDITIONS AMONG KINDERGARTEN STUDENTS

Lee Ann Annotti

Dissertation submitted to the Faculty of the Graduate School of the
University of Maryland, College Park, in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
2013

Advisory Committee:

Professor Hedwig Teglasi, Chair
Professor Paul Gold
Professor Jeffrey Harring
Professor Dennis Kivlighan, II
Professor William Strein

Acknowledgements

I would like to offer special thanks to my advisor and mentor, Dr. Hedy Teglasi, for her commitment and support to my learning, professional development, success, and happiness. This research would not have been possible without her support, the dedication of the research team I worked with, and the schools that participated in the study. I would also like to thank my wonderful friends who supported my research by calling their elementary alma maters and asking if the school would participate the study.

I also want to thank my mother for providing me with every opportunity that allowed me to accomplish this endeavor. Her support, advice, and love provided me with the fortitude and courage to complete my Ph.D.

Most importantly, I want to thank my husband, without whom I could not have made it through graduate school. Thank you for encouraging me, editing papers, allowing me to practice new therapy techniques on you, and supporting our household, so I could focus on my research. You inspire me to be a better person and this degree is as much yours as it is mine. I am truly appreciative of you.

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Chapter One

School readiness is conceptualized as the level of development needed for a child to be able to adequately learn through formal instruction and perform successfully in a classroom environment (Carlton & Winsler, 1999). The first tasks children must address as they enter kindergarten are approaching and interacting with unfamiliar classmates and teachers, and responding to social overtures from others. To address these tasks, children must be able to exhibit prosocial behavior and inhibit antisocial behavior (Ladd, Hearld, & Kochel, 2006). In 2001, the National Center for Early Development and Learning conducted a survey indicating that forty-six percent of kindergarten teachers interviewed reported that children lacked the self-regulatory skills and social competencies to function productively and to learn in kindergarten (cited in Webster-Stratton, Reid, & Stoolmiller, 2008). Based on the tasks children at this age must address, teachers are more concerned with Kindergarteners' regulatory readiness for school activities than with more strictly cognitive and academic aspects of readiness (Blair, 2002).

The National School Readiness Indicators Initiative (Rhode Island, 2005) determined that school readiness is more than a child's incoming academic knowledge and described five domains that contribute to a child's readiness, and one of the five domains is social and emotional competence. Although assessing academic knowledge continues to be a popular method of measuring school readiness, assessment of self-regulatory skills is increasing (Ladd, Herald, & Kochel, 2006; Raver & Zigler, 1997). Due to the increased focus on social competence as an indicator of school readiness, several researchers have made strides in theoretically and operationally defining social competence: Rose-Krasnor's Prism Theory (Rose-Krasnor, 1997); Lalonde and Chandler's (1995) conceptualization of Theory of Mind as the basis of social competence; and Ladd, Hearld, & Kochel's (2006) taxonomy of socially competent

behaviors. In this study the developmental precursors of social competence were examined within the context of self-regulatory abilities, including both temperamental effortful control and cognitive self-regulation, also referred to as Executive Functioning (EF).

Studies report direct linear effects of effortful control, a dimension of temperamental self-regulation, on the development and expression of social competence (Blair, Denham, Kochanoff, & Whipple, 2004; Rothbart & Bates, 1998; Sanson, Hemphill, & Smart, 2004). Effortful control facilitates the modulation of emotion, the internalization of rules and expectations, (Ahadi & Rothbart, 1994; Rothbart & Bates, 1998; Derryberry & Rothbart, 1997; Koschanska, 1993), and shapes the schemas that influence later interpretations and behavior (Teglasi & Epstein, 1998). Schemas are representations about the self, peers, and environment and there are two types: scripted and personal. Scripted schemas are based on objective information and are learned either explicitly or by observing regularities in the environment (Teglasi, 2012; Teglasi, Nebbergall, & Newman, 2011). Personal schemas are an individual's unique pattern of organizing information and acting based on their assumptions about the self, the world, and relationships (Teglasi, 2012). Children with greater effortful control form more accurate and complete schemas, which fosters more accurate interpretations of a current situation, leading to more appropriate behavior.

Effortful control also contributes to the development of higher order cognitive regulatory abilities, namely EF (Blair & Razza, 2007; Lohr, Teglasi, & French, 2004). Effort control is a basic building block for EF competencies that serve as risk or protective factors (Teglasi, Cohn, & Meshbesher, 2004). EF allows individuals to make a plan based on perceived information, initiate the steps of the plan, evaluate the progress, and if something goes awry, be able to modify the approach. The underlying EF skills include attention, working memory, inhibition,

problem-solving, goal setting, and self-monitoring. The EF skills of attention and inhibition are similar to the effortful control processes that appear during infancy and share some common correlates; however, effortful control is a disposition and EF is a deliberate, goals oriented process. In regards to social competence, effortful control shapes the schemas and EF utilizes schemas in working memory and integrates the representations with current information in order to develop goals and plans.

Different schemas are activated based on the situational demands of the classroom environment and these schemas, in-turn, influence behavior differently. When assessing self-regulatory constructs for school readiness, the measures should reflect the array of demands in the classroom environment in order for the results to generalize appropriately. Measures of constructs exist along a continuum of performance conditions, maximal to typical. These performance conditions present differing task demands that reflect the varying demands of the classroom. Maximal conditions provide clear expectations and structure so that there is little to no ambiguity in determining what is expected from the individual. Individuals who are evaluated with measures that present more maximal performance conditions have explicit awareness of the expectations for performance, awareness and acceptance of the instructions to maximize effort, and the individual's performance is examined over a short period of time so that attention and effort remain high (Sackett, Zedeck, & Fogli, 1998). Conversely, typical performance conditions do not provide goals or expectations for behavior, requiring individuals to formulate their own goals and solve problems in order to complete the task (Cronbach, 1960; Sackett et al., 1998). Typical conditions are ambiguous and allow for more than one correct answer or response style.

The relation between measures that fall along the typical-maximal conditions continuum has not been examined in the school readiness literature, but it has been studied in job performance research. Studies assessing job performance by both typical and maximal performance measures have found little correlation between the measures (Cronbach, 1960; DuBois, Sackett, Zedeck, & Fogli, 1993; Sackett et al, 1998). Additionally, predictor variables measured with maximal performance conditions and a criterion measured with typical performance conditions show little correlation (Sackett et al., 1998). The results of the job performance studies indicate that measures with typical performance conditions and measures with maximal performance conditions examine different constructs, and as a result, are not interchangeable. In order to assess relations between constructs, the constructs must be measured along similar performance conditions.

Applying the concept of performance conditions to the measurement of EF and social competence requires an analysis of the items and task demands of the measures used to assess Kindergarteners. Surveys are a popular method of assessing social competence and the items on surveys pose questions regarding a child's behavior within a context. In some contexts during the school day, the environment provides clear guidelines and rules for behaviors, which can be learned. In these well-defined contexts, students rely on the external cues to determine how to behave and it does not require the student to formulate a goal or plan. For example, students learn that when it is story time they are expected to sit still and listen; Story time is the cue for a set of expected behaviors. In well-defined contexts that provide clear guidelines for behavior students rely on scripted schemas to determine appropriate behavior.

On the other hand, there are contexts during the school day that are more ambiguous; requiring the student to interpret the context and determine the appropriate behavior by

connecting emotions and thoughts with actions and goals. For example, if a classmate is upset the student must interpret the emotional tone of the situation and determine when and how to approach the classmate. Surveys that pose questions about behaviors in these more ambiguous situations assess students' individualistic style of interpreting stimuli and integrating information with actions and goals to create a solution, akin to the personal schema. The item content of a survey is similar to the environment that influences the behavior. After conducting an item analysis of two commercially available surveys, it was determined that the Behavior Regulation Index (BRI) from the Behavior Rating Inventory of Executive Functioning (BRIEF) would be used as a measure of social competence under maximal performance conditions and the Social Skills Scale from the Social Skills Improvement System (SSIS) would be used as a measure of social competence under more typical performance conditions. The items of the surveys were classified as presenting typical performance conditions, maximal performance conditions, or both according to a defined set of criteria discussed in Chapter 2. Then, the survey was classified as either presenting maximal or typical performance conditions based on the preponderance of the items.

Similar to assessing social competence, the performance conditions of measures of EF assess different attributes of the construct. Studies of Frontotemporal Dementia (FTD) have differentiated between EF skills that are required to perform well on measures with maximal conditions and measures with typical conditions. The studies indicate that the EF skills required for maximal performance conditions include gathering information and structuring it for evaluation, whereas typical performance conditions require EF skills involving self-control, emotional regulation, monitoring internal and external stimuli, initiating and inhibiting context-specific behavior, moral reasoning, and decision making (UCSF, 2008). The performance

measures of EF are categorized as either maximal or typical based on the directions provided to the individual being assessed and the content of the items in the measure. For this study, the NEPSY: A Developmental Neuropsychological Evaluation (NEPSY) and the NEPSY: A Neuropsychological Evaluation Second Edition (NEPSY-II) were used as the maximal measure of EF and the Thematic Apperception Test (TAT) was used as the typical measure of EF.

Studies using measures with maximal performance conditions to assess EF skills of children who sustained a Traumatic Brain Injury (TBI) report that the results from these measures do not generalize to real-life functioning because the tests decrease the demands on the child's self-monitoring and regulatory skills. For example, the person administering the NEPSY-II to a client provides the self-monitoring and regulatory skills by directing and shifting the attention of the child through directions, teaching samples, corrections, and prompts. As a result, the scores only generalize to similarly maximal contexts. On the other hand, scores based on typical performance measures of EF apply to contexts that require the spontaneous and automatic integration of skills.

This study examined the relations between measures of effortful control, EF, and social competence with a primary focus on the implications of assessing EF and social competence with measures conceived along a continuum of maximal to typical performance conditions. This study is unique in the field of school readiness and self-regulation research because it posits that the relations between constructs are predicated on the selection of measures used for assessment and that the interpretation of constructs changes according to the performance conditions of the measure. Thus, it was hypothesized that constructs measured with similar performance conditions are highly correlated and that measures assessing purportedly the same construct with

differing performance conditions have a low correlation, indicating that typical and maximal performance measures are not interchangeable.

Two sets of equivalent, non-recursive observed variable path analyses were employed to investigate the relations between EF and social competence along varying performance conditions. Model 1a examined the relations between the CBQ-T and measures of EF and social competence when EF and social competence were measured along matched performance conditions (see Figure 1a). Model 1b examined the relations between the CBQ-T and measures of EF and social competence when EF and social competence were measured along non-matched performance conditions (see Figure 1b). A second set of path analyses was conducted solely examining the effects of performance conditions. Model 2a examined the relations between measures of EF and social competence along matched performance conditions (see Figure 2a) and Model 2b examined the relations between measures of EF and social competence along non-matched performance conditions (see Figure 2b). The model fit and the standardized path coefficients of both sets of models were examined to determine the appropriate model.

Hypotheses

1. Models measuring EF and social competence with matched performance conditions (models 1a and 2a) will have a non-significant X^2 value indicating model fit, and the direct path coefficients along the matched performance conditions (p_{32} and p_{54}; see Figures 1.1 and 2.1) will have significant and moderate effect sizes.
2. Models measuring EF and social competence with non-matched performance conditions (models 1b and 2b) will have a significant X^2 value indicating poor model fit, and the direct path coefficients along the non-matched performance conditions (p_{52} and p_{34}; see Figures1.2 and 2.2) will have non-significant and small effect sizes.

Definitions

Before presenting the relevant theory and research, definitions of the key terms in this study are reviewed:

Social Competence- The ability to formulate pro-social goals, regulate emotions and inhibit behavior, monitor the context to determine the appropriate behavior, initiate activity, and evaluate its outcome. It also involves the ability to interpret how one's actions will affect others and be perceived by others, as well as realizing that people can possess different feelings and beliefs from oneself and tolerate those differences (Rose-Krasnor, 1997; Lalonde & Chandler, 1995).

Temperamental Effortful Control- Effortful control modulates emotions and behaviors and includes the abilities of focusing attention, initiating and inhibiting focusing, and inhibitory control (Bridgett, Oddi, Laake, Murdock, & Bachmann, 2013; Rothbart, 2004; Rothbart & Bates, 2006).

Executive Functioning- The process of analyzing information, planning strategies for problem solving, selecting and coordinating cognitive skills, sequencing, and evaluating one's success or failure relative to the intended goal. The underlying skills of working memory, processing speed, response inhibition and fluency of retrieval are imperative to the planning, organizing, and sequencing of problem solving strategies (Carlson, Moses, & Brenton, 2002; UCSF Memory, 2008; Levin & Hanten, 2005; Lezak, 2004; Senn, Espy, & Kaufmann, 2004; Welsh, Pennington, & Groiseer, 1991).

Maximal Performance Conditions of a Measure- Individuals are explicitly aware they are being evaluated, have an awareness of and acceptance of implicit or explicit instructions to

maximize effort, and performance is measured over a limited duration thus enabling the individuals' attention to remain focused on the accepted goal. Individuals know what is expected of them and the test is interpreted the same way for every individual. There is a clear, correct solution to a problem that is presented (Cronbach, 1960; Sackett et al., 1988).

a. Maximal Social Competence- Also referred to as scripted social competence, is the ability to regulate one's behavior and emotions according to rules that have been taught or observed without integrating emotions and intentions. Individuals rely on the structured direction and rules provided by others in order to determine how to act and achieve a goal, as opposed to the meaningful integration of behaviors, emotions, and cues in the context (Lalonde and Chandler, 1995).
b. Maximal Performance Executive Functioning- Problem-solving that does not require the integration of emotions or prior knowledge. Also, regulatory abilities are supported by outside structure, such as directions, cues, and relying on others.

Typical Performance Conditions of a Measure - The stimuli of performance measures under typical conditions are ambiguous allowing for the expression of individuality. The questions are open-ended, which allows the participant to perceive the task demands and organize responses according to their own needs, motives, feelings, and schemas. There are individualistic options for a correct solution to a problem, and many solutions are potentially effective. Individuals are not aware of what aspects of their performance are evaluated, they are not consciously attempting to perform to the best of their ability, and their performance is monitored over an extended period of time (Cronbach, 1960; Sackett et al., 1988).

a) Typical Social Competence- Also referred to as intentional social competence, it is spontaneous and employed in everyday, ambiguous situations (Lalonde and Chandler,

1995). It is the ability to integrate emotions/intentions and behaviors, and use contextual cues to plan how best to act in order to achieve a goal (Rose-Krasnor, 1997). Typical social competence involves false belief understanding, an interpretive theory of mind, an ability to recognize others affective expressions, and the ability to make personalized inferences about thoughts and emotions (Saltzman-Benaiah & Lalonde, 2007)

b) Typical Executive Functioning- Problem-solving that integrates the use of prior knowledge and current information in order to prioritize self-directed goals and plan purposeful behavior that balance short- and long-term goals.

Chapter Two: Overview of the Literature

School readiness refers to the level of development needed for a child to be able to adequately learn through formal instruction and perform successfully in school (Carlton & Winsler, 1999). The "level of development" is traditionally interpreted as the child's incoming academic knowledge; however, recently, the interpretation of "level of development" includes the child's incoming self-regulatory capabilities. Self-regulation broadly refers to the ability to regulate emotions, behaviors, and cognitions. The paradigm shift from interpreting the "level of development" as academic knowledge to self-regulatory capabilities is due to findings that indicate school readiness measures focused on incoming academic knowledge were unreliable in predicting academic achievement in kindergarten and first grade (Carlton & Winsler, 1999) and teachers reporting that self-regulatory capacities are more important than the child's incoming academic knowledge.

In 2001, the National Center for Early Development and Learning reported that 46% of teachers surveyed indicated that children entering kindergarten lacked the self-regulatory and social competencies to function productively and learn in the classroom (cited in Webster-Stratton, Reid, & Stoolmiller, 2008). The central developmental tasks children face when entering school are positive engagement with peers and tasks, and the ability to regulate behavior (Rubin & Ross, 1988). Ladd, Hearld, & Kochel (2006) developed a taxonomy of socially competent behaviors that focuses on building and maintaining relationships while facilitating learning. These skills include approaching and interacting with unfamiliar classmates and teachers, and responding to these persons' social overtures. Children must approach classmates and teachers in a friendly manner, share resources, take turns, cooperate with peers, offer help when it is needed, and include other children in activities as opposed to excluding them.

Self-regulatory competencies are essential indicators of school readiness because they facilitate the ability to actively engage in the learning environment (Raver, 2002; Webster-Stratton, Reid, & Stoolmiller, 2008). Recent research is conceptualizing the self-regulatory capacities essential to school readiness as temperamental regulation (e.g. effortful control), cognitive regulation (e.g. EF), and behavioral regulation (e.g. social competence; Jahromi & Stifter, 2008). As the theoretical underpinnings of self-regulatory competencies central to school readiness are studied, there must also be an examination of measurement issues related to assessing these competencies.

The purpose of this chapter is to explore the relations among measures of EF and social competence across different measurement performance conditions, and the contributions of effortful control to EF and social competence. Socially competent behavior is dependent on the student's interpretations of a situation, and these interpretations are influenced by mental representations about the self, others, and the environment. The accuracy of these mental representations, called schemas, is shaped by effortful control and later utilized in working memory when the student is developing a plan of action. The performance conditions of measures elicit different schemas, thus the relations between constructs change based on the performance conditions. Constructs are defined by the measures employed to measure them, therefore, the performance conditions of a measure impact the interpretation of the construct.

Conceptualizing Effortful Control, EF, and Social Competence

This section will review the conceptual relations between the self-regulatory abilities: effortful control, social competence, and EF.

Temperamental effortful control.

Temperament refers to the relative strength of emotional reactions and a child's ability to self-regulate (Rothbart & Bates, 1998). Temperament is biologically based individual differences in reactivity and self-regulation, which are influenced by maturation and prior experience. Reactivity is an individual's responsiveness to changes in stimulation shown at the behavioral, autonomic, and neuroendocrine levels—more simply, it is one's ease of arousal to stimulation. Factor analyses have indicated that reactivity consists of two dimensions, activity and emotionality, which comprise the behaviors seen during infancy (Rothbart & Bates, 1998). Self-regulation is the processes that modulate one's reactivity and develops after infancy. These processes include effortful control of attention, ability to self-sooth emotions, and delay of gratification (Rothbart, 1989; Rothbart & Bates, 1998).

For the purposes of this study the analyses will focus on effortful control because it most clearly reflects a child's ability to regulate and moderate reactions to stimuli. Effortful control refers to an individual's control over approach or withdrawal tendencies via attentional and inhibitory control mechanisms (Rothbart & Bates, 2006). The Children's Behavior Questionnaire- Teacher version was used as the measure for effortful control (see Table 1; Rothbart, , Ahadi, Hershey, & Fisher, 2001).

Social competence.

In 1972, the Office of Child Development formed a committee of experts with the intention of defining social competence. The panel was unable to agree upon an overarching definition or a method of measuring social competence. However, the panel agreed that social competence consists of several key components: attention, flexibility, adaptability of skills, emotions, knowledge, and empathy (Anderson & Messick, 1974). Several definitions have been provided to conceptualize social competence (see Table 2), and these definitions tend to focus on

the ability to regulate and inhibit behavior and engage in pro-social behavior to achieve a developmental goal.

Rose-Krasnor (1997) developed a model called the Prism-Theory of social competence that defines social competence as effectiveness in interaction, considered from both the self and others' perspectives. It is an organizing construct that presents three levels: the top level presents the theoretical conceptualization, the middle level is the Index level, and the bottom level presents discrete social skills. The theoretical level is defined as effectiveness in interactions with others in order to meet both short- and long-term developmental goals. An important caveat to this model is that the behaviors and interactions are judged within a context—all behavior is context-dependent. The Index level reflects two basic human dimensions that are necessary for healthy development: autonomy and communion (Bakan, 1996; Rose-Krasnor, 1997). At this level, social competence is the ability to balance one's personal needs and the needs of others, and the effectiveness of establishing relationships as viewed by the self and viewed by others. The Skills level identifies specific behavioral and emotional abilities such as perspective-taking, effective communication, empathy, affect regulation, and social problem solving. Overall, Rose-Krasnor's Prism conceptualizes social competence as transactional, context dependent, and goal-oriented.

Rose-Krasnor's model assumes that competence is performance in 'typical,' everyday interactions as opposed to interactions under ideal circumstances. Children must be able to flexibly adapt in order to interpret and meet the demands of everyday situations, and discriminate between behaviors that are considered appropriate at one age or in one context and not in another (Dodge, Pettit, McClaskey, & Brown, 1986; Waters & Sroufe, 1983). As a result, social

competence is dependent on the child's ability to accurately interpret a situation and flexibly respond.

Executive functions.

EF is typically defined as a higher order self-regulatory ability comprising metacognitive abilities. There are many definitions of EF (see Table 3), and taken together, EF is our executor: EF determines what information is important and allows individuals to make plans based on the information, initiate steps to carryout the plan, evaluate the progress, and modify the approach if the initial approach is not effective. Cognitive theory tends to define EF as three distinct, yet interrelated, skills that facilitate this process: attentional control, inhibition, and updating/monitoring information in working memory (Bridgett, Oddi, Laake, Murdock, & Bachmann, 2012; Miyake, Friedman, Emerson, Witzki, Howerter, & Wager, 2000). Attentional control is the ability to focus, sustain, and shift attention between multiple tasks or mental sets. Inhibition is the ability to suppress a dominant or automatic response, suppress the retrieval of irrelevant information from memory, and resist distraction (Logan, 1994; Bjork, Bjork, & Anderson, 1998; Eriksen & Eriksen, 1974; Sternberg, 1966). Working memory is the ability to monitor the environment for feedback and code new information. This requires the ability to hold multiple events or pieces of information in the mind, manipulate it, act on the information, imitate complex behavior sequences, have hindsight and foresight, a sense of time to allow for temporal organization of behavior, and the ability to integrate new information with old information (Barkley, 2001; Bridgett et al., 2012).

Effortful Control as the Foundation for Social Competence and EF

This section explains that temperamental effortful control is the basic building block for social competence and EF. The dimensions of temperamental effortful control, such as attention

and inhibition, are suggested to be the basis of social competence (Bohlin, Hagekull, & Anderson, 2005; Rothbart, 2004; Sanson et al., 2009). Effortful control facilitates the modulation of emotions and the internalization of conduct rules (Blair, Denham, Kochanoff, & Whipple, 2004; Rothbart, & Bates, 1998; Sanson, Hemphill, & Smart, 2002), which guide behavior (Kochanska et al., 1996). Problems with temperamental effortful control are risk factors for behavioral and emotional adjustment, both concurrently and longitudinally (Lohr, Teglasi, & French, 2004; Rothbart & Bates, 1998; Sanson, Letcher, Smart, Toubourou, & Oberklaid, 2009).

A longitudinal study assessed the relation between effortful control and the development of social competence during toddlerhood and school adjustment at ages eleven and twelve (Sanson et al. 2009). Children were categorized into four clusters based on the child's level of inhibitory control, attention regulation, and reactivity. Results indicate that the temperamental cluster impacted social skills and the development of behavior problems. Children with poor attention regulation and low inhibition appeared to be at greater risk for later externalizing problems, internalizing problems, poor social skills, and low academic achievement. Children with poor attention regulation were particularly at risk for developing hyperactivity and attention problems. Lastly, children with high inhibition and low attention regulation were at greater risk for parent-reported anxiety, externalizing problems, and poor social skills (Sanson et al., 2009). Children characterized by an early temperament of low effortful control tended to have more behavior problems, poorer social skills, and lower school functioning than children who were characterized as high in effortful control.

The direct relation between effortful control and social competence is also evident in the preschool years. Children with "easy" temperaments are rated higher in effortful control as compared to children characterized with "less easy" temperaments. Preschoolers with "easy"

temperaments are more likely to display socially competent behavior than their "less easy" peers (Blair et al., 2004).

Effortful control is also suggested to be the foundation of EF. Conceptually, effortful control and EF are similar constructs because both involve similar processes, share similar genetic origins, share similar developmental trajectories, and share some common correlates (Bridgett et al., 2013). However, some researchers argue that effortful control and EF are distinct constructs for several reasons: One, effortful control is conceptualized as a unitary construct and EF involves distinct, yet interrelated skills; Two, the neural network underlying effortful control involves quick, automatic processes whereas EF involves slower, more deliberate processes (Blair & Ursache, 2011); Three, though effortful control and EF working memory are associated with the expression of negative affect, only EF inhibition is associated with the expression of negative affect (Bridgett et al., 2013). To make sense out of the conceptual and empirical overlap between effortful control and EF, some have argued that effortful control is a basic disposition that is a building block for EF skills that serve as higher-order risk or protective factors (Teglasi, Cohn, & Meshbesher, 2004).

A Theoretical Model of Self-Regulatory Abilities Based on Schemas

Socially competent behavior in the classroom is dependent on the students' interpretation of a context. That interpretation is dependent on mental representations, called schemas, a student has about the self, others, and the environment. Effortful control influences the accuracy and completeness of these schemas, which are then utilized by EF to determine purposeful, goal-oriented plans and behaviors. This section describes the relations between effortful control, EF, and social competence based on the schemas students utilize to engage in socially competent behavior.

Schemas are internal representations of past experiences that influence the processing and interpretation of new experiences (Teglasi, 2012). The development of these representations is limited by what is noticed and by how that information is organized. The accuracy and completeness of schemas may be constrained if information processing is chronically disrupted by problems with self-regulation, or by a poor fit between children's temperamental tendencies and environmental expectations (Thomas, 1977; Teglasi, 2001). Teglasi (2012) described two types of schemas, scripted and personal, that individuals utilize depending on the demands of the environment or context.

Scripted schemas are based on objective information that is independent of emotionally laden experiences. They incorporate general expectations about commonly occurring situations, such as standing in line or raising your hand to ask permission (Teglasi et al, 2012). Scripts are employed in structured situations that provide cues for expected behaviors and this process may occur consciously or automatically. For example, students are typically quiet when they enter the library, but yell and play on the playground. The setting elicits a script that informs appropriate behavior. Thus, social competence according to scripts is learned cultural and social conventions for behavior.

The second type of schema is the personal schema. Personal schemas guide reactions in a situation without cues or incentives (Teglasi et al., 2012). As opposed to scripted schemas, personal schemas are the products of the interpretations of past personal experience, which form representations that guide future expectations, interpretations, and behaviors. Personal schemas more often occur outside of awareness and are active in ambiguous situations.

It is in the development of personal schemas that the reactive and self-regulatory aspects of temperament play the greatest role. Children with greater effortful control are able to attend

to information and form more accurate representations about the self, peers, and classroom environment. The more accurate the representations the more intact and complete the schemas (Teglasi & Epstein, 1998). Effortful control shapes these schemas that are later utilized in working memory (Lohr et al., 2004; Teglasi & Epstein, 1998; Reed & Derryberry, 1995).

When schemas are activated, they are held in working memory and influence the information individuals attend to, the inferences made about an event, and influence plans, goals, and actions in a current event. The nature of the schema has implications for social competence: a child's representations could be distortions that are inappropriately generalized to later relationships or events. Children rated low in effort control tend to appear anxious in novel situations, such as entering Kindergarten, but children who also posses adequate EF skills may be able to develop coping strategies to overcome the anxiety, allowing them to adapt to the environment and update their schemas. As a result, children with greater EF skills can evaluate and update schemas based on experience. EF regulates the expression of the schemas shaped by effortful control and facilitates children's social competence by aiding in the planning, initiation, organization, problem-solving, and monitoring of behavior activity (Cole, Usher, & Cargo, 1993; Kopp, 1989).

The theoretical and empirical evidence indicates that effortful control contributes to the development of EF and social competence, and that EF regulates the expression of schemas shaped by effortful control while contributing to social competence. The relations between these constructs, however, are dependent on the measures used to assess EF and social competence. Performance conditions do not theoretically apply to temperamental effortful control because temperament is a general theory that is context-free; effortful control is a disposition.

Performance Conditions of Measurement

Performance conditions of measures place certain parameters on the task demands that influence the participant's approach to the task. The performance conditions of measures elicit different schemas to complete the task just as the environment elicits different schemas that influence goals, problem-solving, and behaviors. Thus, the method of assessing EF and social competence has important implications for the interpretation of the results. This section will define the performance conditions of measures and discuss the effects of performance conditions on the assessment of executive functioning and social competence.

Measures can be classified along a continuum of performance conditions ranging from maximal to typical (Cronbach, 1960; Sackett et al., 1988). Measures that have maximal performance conditions establish an environment that assesses how well a person can perform under optimal conditions. Since maximal performance conditions assess what a person can do under conditions that provide structure and cues, students rely on scripted schemas to complete the tasks. Typical performance conditions establish an environment that assesses how well a person performs under every day, ill-defined situations that require individuals to interpret the appropriate responses to a situation. Thus, students rely more on personal schemas to complete tasks that present more typical performance conditions. Cronbach (1960) stated that measures with maximal performance conditions assess ability, while typical performance conditions assess personality. This may have implications for the interpretation of the results gleaned from the assessment.

Three conditions must be met for behavioral questionnaires and performance measures to be categorized as measures with maximal conditions (Sackett et al., 1988). First, there must be an explicit awareness that one is being tested. Second, there must be an awareness of and acceptance of the implicit and/or explicit instructions to maximize the amount of effort given to

the test. Third, the test must be administered over a short duration so that the performer's attention and effort remains focused on the test. Maximal performance conditions provide a significant amount of structure by providing clear directions and standards that guide responses and have a definitive, correct answer to questions (Cronbach, 1960). Also, the perceived importance of the activity promotes a heightened level of effort and attention that may be uncharacteristic and cannot be sustained. Tests such as A Neuropsychological Assessment-2nd Edition (NEPSY-II; Korkman, Kirk, & Kemp, 2007) are considered performance measures that present maximal conditions. These tests measure the ability of the performer and ability is measured the same way across individuals. Contrasting maximal performance conditions is typical performance conditions. Under typical conditions, the performer is not aware that his/her performance is being observed, which reduces the likelihood of individuals' exerting their best effort (Sackett et al., 1988). Typical performance conditions do not provide clear directions or performance standards so the performer has to interpret the stimuli in their own individualistic style. As a result, these measures permit a variation in answers, which reveals how the performer is able to independently integrate information, manipulate it, and create a solution (Cronbach, 1960; Sackett et al., 1988; Teglasi et al., 2011). Typical performance conditions are likely to elicit personal schemas to complete the tasks because there are minimal cues for how to approach the task and the student must interpret the task based on their individual past experience.

Cronbach (1960) hypothesized that measures with different performance conditions assess different constructs. Sackett et al. (1988) studied the relation between measures of typical and maximal performance conditions when assessing job performance and how the measures differentially related to the criterion variable. The results indicate that the correlation between

the two measures was low and only the maximum measure correlated with the criterion variable. Sackett et al. (1988) concluded that measures of typical and maximal performance conditions do not yield comparable information and reveal real life phenomena differently. Cronbach (1960) questioned the value of assessing what a person can do under optimal conditions if the person cannot perform the behavior spontaneously and automatically under normal, everyday conditions. These concerns also apply to assessing social competence and EF: children should be assessed by measures that evaluate what they can do automatically and independently, as well as what they can do under optimal conditions. Assessing constructs under both conditions provides valuable information regarding what children can do with and without supports. This is especially helpful in determining recommendations for children referred for a psychological evaluation.

Assessing social competence and EF in highly-structured, well-defined conditions may not accurately predict the child's real-life functioning. Typical conditions are analogs to real life expectations because individuals are expected to be able to navigate their environment without ample amounts of directions and cues for appropriate behavior. Individuals are expected to be able to size-up situations and respond appropriately and independently. Maximal conditions assess what an individual can do with supports, cues, and clear directions and expectation. As a result, the conceptualization of EF and social competence change based on the different demands that typical and maximal performance conditions exert on individuals. The individual's performance must be interpreted within the scope of the performance conditions because the differing conditions elicit different schemas, which alters the interpretations of the results.

Assessing social competence.

Lalonde and Chandler (1995) studied different expressions of social competence along a continuum of intentionality by conducting an item analysis of questionnaires commonly used to assess social competence. Lalonde and Chandler (1995) created a questionnaire of 80 items drawn from the Vineland Socialization Scale and the Portage Checklist and then added their own items based on the subjects' understanding of mental states. They determined that there are two types of social competence: *Intentional a*nd *conventional*.

The "Intentional" items require an understanding of mental states and covered self-direction within a group, solitary and social pretence, the ability to monitor one's own and others' behavior, and the ability to manage conflict by acting on others' intentions and desires. Some examples of Intentionality Items are: 1."Follows rules in simple games without being reminded," 2."States goals for him/herself and carries out activity," 3."Engages in simple make-believe activities alone and with others," and 4."Ends conversations appropriately." They found that these items were substantially and significantly correlated with Theory of Mind (r = .51) and also involved false belief understanding, an understanding of display rules, and the ability to make personalized inferences about thoughts and emotions (Saltzman-Benaiah & Lalonde, 2007). Children who are better developed in Intentional social competence possess better competence when the environmental demands change unexpectedly or the situation is ambiguous and unstructured.

The second list for "Conventional" items, which did not require an understanding of mental states, included items such as, 1. "Says thank you when given something," 2. "Says please when asking for something," and 3. "Follows rules in group games led by others." They gave this questionnaire to preschool teachers to rate the social competence of their students using a 3-point Likert scale. These items are minimally correlated (r = .12) with Theory of Mind and

are not based on integrating empathy, intentions, and goals with the behavior. The behaviors are produced because an individual has been taught to respond in a particular manner in a structured setting or has observed a routine behavior in a structured setting. For example, a child learns to say 'Thank you,' in the lunch line after being served a sandwich; the child is utilizing a scripted schema. The two surveys created by Lalonde and Chandler (1995) presented different performance conditions for rating behavior. The Intentional items presented more typical performance conditions assessing the children's ability to independently act based on their own interpretation of an emotionally laden context, while the Conventional items presented more maximal performance conditions assessing scripted, learned behaviors that do not require an interpretation of the context that involves the integration of prior experience and emotions. The two surveys predict different socially competent behaviors, and as such, the surveys cannot be used interchangeably.

Assessing social competence across a continuum of performance conditions.

Typically, children's social competence is measured with questionnaires that are completed by parents and teachers. The items on the questionnaires create conditions under which the child's behavior is evaluated. For the purposes of this study, teachers completed the BRI from the BRIEF and the Social Skills Scale from the SSIS as an indicator of a student's social competence.

The two questionnaires present items that fall along the maximal-typical conditions continuum. Criteria were created to determine if the items on the surveys presented more maximal conditions or more typical conditions (see Table 4). Items that present more maximal conditions inquire about behaviors that are externally guided and can be learned, whereas items that present typical conditions inquire about students' ability to interpret the situation and

integrate personal emotions with the needs of others. While conducting the item analysis, not every item was characterized strictly as maximal or typical, and some items were not categorized because the items inquired about dispositional tendencies. As a result, the measures were characterized as maximal or typical based on the preponderance of the items. After completing the item analysis, the BRI of the BRIEF was determined to be a questionnaire that presents more maximal conditions and the SSIS was determined to be a questionnaire that presents more typical performance conditions.

The appropriate interpretations about social competence gleaned from the surveys differ due to the performance conditions of the task demands. Due to the varying performance conditions, the items on the BRI, such as "gets out of seat at the wrong times," implies that there is a rule in the classroom about the appropriate times to be in ones seat. Items like "gets out of seat at the wrong times," may better predict behaviors in more scripted scenarios, occurring in environments that present clear expectations and cues for behavior. On the other hand, items on the Social Competence Scale, such as "tries to comfort others," may better predict behaviors that occur in more ambiguous scenarios, requiring children to initiate and integrate their own emotions with the needs of others.

Assessing EF.

In most cases, EF is assessed with performance measures that are highly structured, administered in a distraction-free environment, and the measures provide individuals with cues on how to respond; these would be considered measures with maximal performance conditions. Neurologists and neuropsychologists argue that maximal performance measures that present these types of conditions are not accurate measures of real life EF for children that sustain a Traumatic Brain Injury (TBI; Ganesalingam, Yeates, Walz, Taylor, Stancin, & Wade, 2011).

The argument lies with three essential problems in assessing EF with maximal performance measures: one, the tests are highly structured and provide cues to initiate and maintain behaviors; two, the tests assess EF skills discretely (subtests are designed to assess the skills separately) as opposed to the integration of EF skills to solve a problem; and three, the test responses are not as complex as those required in the natural environment, such as the school environment (Ganesalingam, Yeates, Taylor, Walz, Stancin, & Wade, 2011; Crawford, Espy, Gioia, Isquith, 2005; Silver, 2000).

Ganesalingam et al. (2011) used a variety of EF measures to examine the performance of children who had sustained a TBI. The measures of EF presented different performance conditions. One performance measure was highly structured, administered in a distraction-free environment, and provided cues on how to respond, the other measure provided less structure and assessed the child in the natural environment filled with distractions. The results indicate that performance measures with more maximal conditions may sometimes lack ecological validity. The measures that present maximal performance conditions may underestimate the EF disabilities a child is experiencing navigating everyday tasks, or overestimate the difficulties faced in the classroom because the measure is unable to assess any compensatory skills the child is able to enlist (Gioia & Isquith, 2004).

In Ganesalingam et al.'s (2011), children could perform well on measures with maximal performance conditions of EF yet still exhibit difficulties in the everyday behavioral aspects of EF. In terms of assessment, individuals apply different schemas based on the performance conditions of the task demands. More maximal performance conditions elicit scripted schemas because of the cues and directions for how to perform, and guidance from the assessor directing attention and correcting incorrect responses. On the other hand, more typical performance

conditions elicit personal schemas because the individual must independently regulate attention, decide what is important, self-monitor performance by reviewing directions based on memory, and apply their own intentions and goals.

Assessing EF with measures across a continuum of performance conditions.

The Attention and Executive Functioning Domain of the NEPSY-II is a commercially available performance measure of EF that presents different performance conditions than the TAT. In order to conceptualize and interpret EF according to the NEPSY-II or the TAT, the performance conditions of the task demands must be clearly understood. Interpreting measures with differing performance conditions in the same manner simply because they are both called measures of EF can be diagnostically misleading (Koziol & Budding, 2009).

The NEPSY and NEPSY-II. For the purpose of this study, the following subtests from the NEPSY-II were used to assess the EF skills of Kindergarteners: Auditory Attention, Design Fluency, Inhibition, and Statue. In addition to these subtests, the Tower subtest of the NEPSY Developmental was used to assess EF because it requires planning, attention, inhibition, and goal-directed problem-solving (Table 5; Korkman, Kirk, & Kemp, 1998; 2007).

The NEPSY allows the assessor to direct the child's attention to important information, provide directions regarding how to perform the task, provide repetition of directions, model the appropriate way to complete the task, provide practice items, and correct the child if the child commits an error. On the Auditory Attention, Design Fluency, Inhibition, and Tower subtests the child is also provided immediate feedback about the successfulness of their initial strategies and allowed practice items before completing the task. These conditions decrease the ambiguity of the task for the child. The tasks assess scripted schemas more so than personal schemas because the conditions provide the child with the end-goal, the strategies, and the necessary

information to obtain the goal. Essentially, the assessor assists with the self-monitoring and regulatory skills as well as directs attention for the child during the assessment.

Thematic Apperception Test. Based on Teglasi's (2012) interpretation and scoring system of the TAT, it is a performance measure that presents more typical performance conditions. The TAT consists of pictures that depict people in ambiguous states of tension for which the individual is asked to create stories. The task requires problem-solving to formulate a dilemma that fits the stimulus, recognition of the tensions faced by the story characters, and calls for reasoning to resolve the dilemma in ways that address both the problem and emotional issues. The narrator creates a storyline that integrates details that are noticed, while possibly modifying the initial approach in accord with his or her understanding of cause-effect connections (Teglasi, 2012). The individual's schemas guide the creation of the story. The TAT conceptualizes EF as problem-solving that integrates prior knowledge with current information in order to prioritize goals and plan purposeful behavior, both in the moment and long term.

For the purposes of this study, specific sections of Teglasi's (2012) scoring system were adapted to assess Kindergarteners' EF. The sections include the Level of Abstraction, Level of Perceptual-Conceptual Integration, Level of Cognitive and Experiential Integration, Level of Associative Thinking, and Levels of Self-Regulation (see Table 6). The TAT does not provide the individual with strategies to resolve the pictured dilemma or inform the individual of what information is pertinent to resolving a problem. The narrator must independently determine what details in the picture to incorporate into the story, accurately interpret the pictured scene, and synthesize the information. Taken together, these levels assess the narrator's ability to understand cause-effect relations, attentional control, ability to plan, synthesize and organize information, ability to initiate and inhibit activity and thoughts, working memory, ability to self-

monitor, and the ability to flexibly problem-solving based on integrating prior experience with current information.

Relations between EF and social competence measured along varying performance conditions.

After considering the task demands of the NEPSY/NEPSY-II and the TAT, the interpretations of EF differ due to the performance conditions of the task demands. Results gleaned from the NEPSY should be interpreted as what the student can do under maximal, highly structured conditions, and results from the TAT should be interpreted as what the child is able to do spontaneously and independently. The interpretations of the two different tests generalize to different contexts in the school environment. As such, the two different measures should differentially relate to varying measures of social competence as a result of the performance conditions.

Results from neurological studies indicate that EF contributes to significant variance in the prediction of social competence (Baron, 2004; Ganesalingam et al., 2011); but, that relation may change based on the performance conditions of the measures used to assess EF and social competence. For example, students with poor inhibitory control are characterized as blurting out answers, unable to wait their turn, interrupting conversations, and may seem to act without thinking (Logan, 1994; Bjork, Bjork, & Anderson, 1998; Sternberg, 1966; Eriksen & Eriksen, 1974). Tests that provide clear directions, practice problems, corrective feedback, prompts that assist participants in initiating activity and maintaining focus, and are void of emotional stimuli provide students with optimal conditions. Under these conditions, the student is better able to inhibit and regulate behavior to complete the task. Thus, the results may not generalize to the problems with social competence that are evident in the classroom. The NEPSY/NEPSY-II tasks

may better predict surveys of social competence that present questions that assess behaviors in more scripted scenarios, occurring in environments that present clear expectations and cues for behavior. The TAT, on the other hand, may better predict surveys of social competence that present questions that assess behaviors in more ambiguous scenarios, requiring children to determine the most appropriate behavior independently.

Chapter Three: Research Design and Methodology

Summary of Purpose

The purpose of this study was to examine the relations among measures of self-regulatory constructs important to school readiness, with a primary focus on examining the relations between EF and social competence when measured across a continuum of performance conditions. The constructs should be interpreted according to the performance conditions in order to understand how the results predict behavior in the real-world context.

An observed variable path analysis was used to study the effects performance conditions exert on the relations between measures of EF and social competence. EF and social competence can be measured with tasks or questionnaires that are referenced to well-defined, structured contexts or referenced to more ambiguous contexts. EF was measured under maximal performance conditions, using the NEPSY/NEPSY-II, and under more typical conditions, using the TAT. Social competence was also measured under maximal conditions, using the BRI scale from the BRIEF, and under more typical conditions, using the Social Skills Scale from the SSIS. Temperamental effortful control was not measured under varying performance conditions because temperament is considered a disposition that is context-free. Effortful control was measured with the CBQ-T , and vocabulary was controlled for with the Wechsler Preschool and Primary Scale of Intelligence-Third Edition (WPPSI-III).

Participants

Kindergarten students and their teachers were recruited from six private schools within the greater Washington, D.C. metropolitan area, one private school from the greater Chicago area, and one from the greater New Orleans area. Initially the participants included 64 Kindergarten students and their respective teachers, but one student withdrew and one refused.

In the end, the participants included 62 students, 29 males and 33 girls, with a mean age of 70.02 months (age range = 60 - 82 months; SD = 4.89), and their respective teachers. The majority of parents characterized their child's race as Caucasian (n = 45), and the other 17 students were characterized as African American, Hispanic, or Asian (n = 4, 6, and 6; respectively), and one participant did not report. A total of 16 teachers participated in the study (15 female, 1 male). Four of the schools had multiple Kindergarten classrooms with a lead teacher in each room, three of the schools had one classroom with one teacher, and one school had one classroom with three teachers. In all classrooms with a lead teacher, the lead teacher completed the rating scales, and in the one classroom with three teachers, the teachers randomly divided the rating scales amongst themselves.

Measures

Temperament.

Children's Behavior Questionnaire-Short Form: Teacher (CBQ-TSF). Teglasi adapted the CBQ-TSF from the caregiver Child Behavior Questionnaire, Short Form (CBQ-SF; Putnam & Rothbart, 2006), to assess teacher-rated temperament in children ages 3-7 years. The instructions direct the teachers to "read each statement and decide whether it is a true or untrue description of the above named child's reaction within the past six months." Teachers rate the children according to a 7-point Likert scale that ranges from 1= extremely untrue of your child to 7 = extremely true of your child. The instructions also include a Not Applicable (N/A) option if the informant has never seen the child in the situation described.

Factor analyses of the CBQ-TSF reliably recover a three-factor solution indicating three broad dimensions of temperament: Extraversion/Surgency, Negative Affectivity, and Effortful Control. A factor analysis of the effortful control factor on the caregiver-report CBQ indicated

that the effortful control factor is composed of inhibitory control, perceptual sensitivity, low intensity pleasure, and attentional focusing (e.g., Child Behavior Questionnaire [CBQ]; see Table 1; Rothbart, Ahadi, Hershey, & Fisher, 2001). In a previous study, the CBQ-TSF was distributed to pre-school teachers and the internal consistency of the effortful control scales was calculated using Cronbach's Alpha. Cronbach's alpha for the scales was acceptable for the Inhibitory Control ($\alpha = .82$), adequate for the Attentional Focusing ($\alpha = .79$) and Perceptual Sensitivity ($\alpha = .71$) scales, and questionable for the Low Intensity Pleasure ($\alpha = .67$) scale (Teglasi et al., manuscript in preparation). Reliability of the subscales that load on effortful control was calculated for the current study because the previous study did not assess reliability using Kindergarten students and Kindergarten teachers, thus the previous reliabilities may not be an adequate reflection of reliability for this sample.

In this study, Cronbach's alpha was acceptable for Attentional Focusing ($\alpha = .82$) and Inhibitory Control ($\alpha = .85$), adequate for the Perceptual Sensitivity scale ($\alpha = .75$), and questionable for the Low Intensity Pleasure scale ($\alpha = .68$; reliability interpreted according to Nunnaly, 1978). Teachers indicated NA on many of the items on the Perceptual Sensitivity and Low Intensity Pleasure scales (see Table 7), resulting in substantially lower reliabilities than the reliabilities for the Attentional Focusing and Inhibitory Control scales. Items on the Perceptual Sensitivity scale, such as "Doesn't usually notice odors, such as perfume, smoke, cooking, etc.," and Low Intensity Pleasure scale, such as "Likes the sound of words, such as nursery rhymes," may be difficult for teachers to observe in the Kindergarten classroom. Due to the lower reliability scores and number of items indicated as NA on the Perceptual Sensitivity and Low Intensity Pleasure scale, and because theoretical conceptualizations of effortful control define effortful control as executive attention and inhibition (Rothbart, Ellis, Rueda, & Posner, 2003)

the Perceptual Sensitivity and Low Intensity Pleasure scales were not included in the composite effortful control variable. The Attentional Focusing and Inhibitory Control scales were averaged together as the indicator for effortful control.

Executive functioning.

Thematic Apperception Test (TAT). The TAT is a performance measure that is typically used as a measure of social-emotional competence; however, selected scoring schemes from Teglasi's (2012) scoring system reflect EF skills. The TAT requires the participant to view a stimulus card with a picture of characters and identify the problem, understand the causal sequences, understand the inner thoughts, feelings, and intentions of the characters, and understand means-end connections (proposing a way to resolve the tension as perceived in the stimulus card). The tasks of the TAT approximate conditions defined in this study as "typical." The TAT consists of 31 black-and-white cards that present pictures such as a boy looking at a violin, three people engaged in different activities on a farm, and a woman opening a door to a room. For a reliable assessment with the TAT, at least six stories must be obtained from the participant (Lundy, 1985): Cards 1, 2, 3, 5, 7, and 13 were administered to the participants. The TAT assesses motivation, attention, planning, organization, self-monitoring, inhibition, maintaining a response set, updating information, coordinating multiple pieces of information, goal formulation and pursuit of long-term goals (Teglasi, 2012).

Inter- rater reliability for thematic techniques tends to exceed the .80 to .85 range when interpretive criteria are clearly outlined and interpreters are well trained in the rating procedure (Lundy, 1985). The TAT was scored using the following scales from Teglasi's (2012) scoring system: Levels of Abstraction, Levels of Perceptual-Conceptual Integration, Levels of Cognitive-Experiential Integration, Levels of Associative Thinking, and Levels of Self-Regulation.

Possible scores range from 1 to 5 on all scales except Level of Abstraction, which is scored across a range of 1 to 4. With training and practice, interrater reliability in each of the coding scales is .80 or higher (Blankman, Teglasi, & Lawser, 2002; Teglasi, Locraft, & Felgenhauer, 2008).

Two raters independently scored 126 stories for the Level of Abstraction, Level of Perceptual Integration, Level of Cognitive Experiential Integration, and the Level of Associative Thinking scales, and 114 stories for the Level of Self-Regulation scale; double scoring 33% of the stories. A fixed effects ICC was calculated between two raters for absolute agreement and the results yielded the following reliability scores: .90 for the Level of Abstraction, .89 for the Level of Perceptual Integration, .90 for the Level of Cognitive Experiential Integration, .90 for the Level of Associative Thinking, and .94 for the Level of Self-Regulation. ICC values $\geq .75$ represent excellent reliability (Shrout & Fleiss, 1979), thus the scores on the TAT between two raters were interpreted as highly reliable.

Any discrepancies while establishing interrater reliability were reconciled and the reconciled score was used as the final score. Reliability for the primary rater's ratings was calculated using Cronbach's alpha. The reliability was acceptable on the Perceptual Integration ($\alpha = .79$) and Associative Thinking ($\alpha = .76$) scales, and good on the Abstraction ($\alpha = .87$), Cognitive-Experiential Integration ($\alpha = .80$), and Self-Regulation ($\alpha = .85$) scales.

In order to analyze the relations among the five scales, Pearson's correlation was calculated between all of the scales and a principal axis analysis, as well as Horn's parallel anlaysis, was conducted to determine the number of factors the scales yield. The correlations among the five scales were substantial, ranging from .74 to .91 (see Table 8). The principal axis factor analysis yielded a one-factor solution, retaining components with Eigen values greater

than 1 (i.e. the Kaiser Stopping Criterion; see Table 9), as did Horn's parallel analysis (see Fig 3). Since the scales were substantially correlated and the principal axis factor analysis yielded only one factor, all five scales were averaged together to derive the composite TAT EF score.

A Developmental Neuropsychological Assessment (NEPSY)/ Neuropsychological Assessment-2nd Edition (NEPSY-II). The NEPSY is a performance measure that assesses 6 domains: Attention and Executive Functioning, Language, Memory and Learning, Sensorimotor, Social Perception, and Visuospatial Processing. Age appropriate subtests from the Attention and Executive Functioning Domain of the NEPSY-II, as well as the Tower subtest from the NEPSY, were used as a measure of EF. The subtests from the NEPSY-II include Auditory Attention (listening to instructions and responding), Design Fluency (generate novel designs as quickly as possible by connecting two or more dots), Inhibition (a timed subtest that assesses the ability to inhibit automatic responses in favor of novel responses), and Statue (listening to and following instructions). The Tower subtest requires the child to move three colored balls to target positions on three pegs in a prescribed number of moves with rules to which the child must adhere. The Attention and EF Domain of the NEPSY-II and the Tower subtest from the NEPSY approximate the performance conditions defined as "maximal." The subtests provide clear guidelines for how to complete the task, provide practice items, the examiner is able to correct any errors on the practice items, the examiner is allowed to direct the participant's attention to important aspects of the task, and prompt the participant to engage in the activity.

The authors of the NEPSY and NEPSY-II calculated the average test-retest reliability coefficients across ages 5 to 6. Test-retest reliability was reported because the subtests' scores are based on item-level scores that are not strictly independent, due to either allowed latency time within which the child can respond and receive credit. The average reliabilities from the

Attention and Executive Functioning Domain are as follows: Auditory Attention (.91), Design Fluency (.59), Inhibition Total Errors (.74), and Statue (.88; Korkman, et al., 2007). Reliability for the Tower subtest for children ages 5 and 6 is .89 and.90, respectively.

To determine how to composite the subtest scores, the correlations among the subtests were analyzed, a principal axis factor analysis was conducted, and Horn's parallel analysis was conducted. Inhibition was the only subtest that did not correlate with any other subtest (see Table 10), and the principal axis factor analysis yielded a two-factor solution with Auditory Attention, Design Fluency, Statue, and Tower merging onto one factor and inhibition onto another factor (see Table 11). However, Horn's parallel analysis was not as strong an indicator of a one-factor solution as the results were for the TAT (see Fig 4). A mean NEPSY EF score was calculated using Auditory Attention, Design Fluency, Statue, and Tower, excluding the Inhibition subtest because the it did not correlate with the other subtests, it merged onto a separate factor using the principal axis factor analysis, and the NEPSY conceptualizes the subtests as independent from each other.

Social competence.

Social Skills Improvement System (SSIS). Items on the SSIS are divided into three sections: Social Skills, Academic Competence, and Problem Behaviors. For the purposes of this study, the teacher completed the Social Skills items for every student. The Social Skills scale consists of 46 items that assess communication, co-operation, assertion, responsibility, empathy, engagement, and self-control; together these scales assess positive behaviors. The teacher rates items according to how often the student demonstrates the behavior: Never, Seldom, Often, and Always. The Social Skills scale reports scores in standard scores ($\mu = 100$, S.D. = 15). A standard score one standard deviation greater than 100 indicates that the individual exhibits more

social skills than the average student in the population and standard scores one standard deviation below 100 (score ≤ 85) indicates that social skills are lower than the average student.

According to the criteria previously described for categorizing surveys as maximal or typical, the SSIS approximates typical performance conditions. The Social Skills scale includes items such as, "Tries to understand how you feel," "Tries to make others feel better," and "Stands up for others who are treated unfairly." The items ask about behaviors that require the child to appropriately interpret social situations, self-initiate and monitor behavior within a context, and integrate theory of mind with problem-solving.

Authors of the test reported internal consistency for the Total Social Skills score on the Teacher Form for ages 5 to 12 as $\alpha = .97$ (Gresham & Elliot, 2008; Gresham, Elliot, Vance, & 2011). Test-retest reliability correlation for Social Skills scale on the Teacher form is moderately high ($r = .84$), indicating that the teacher's perception of social skills behaviors is fairly stable over a period of a few weeks (Gresham & Elliot, 2008). In the current study, Cronbach's alpha of the teachers' ratings of students' social competence was also high ($\alpha = .92$), and comparable to the reported alpha by the test authors.

The correlations among the Social Skills subscales are positive and moderate to high; however, correlations involving the Cooperation and Assertion subscales include coefficients below .50, suggesting that these two maybe more distinct. The Social Skills scale covaries with the Social Skills Scale of the Behavior Assessment System for Children (BASC; $r = .78$), the Socialization Domain of the Vineland Adaptive Behavior Scales, Second Edition (Vineland-II; $r = .64$), the Walker-McConnell Scale of Social Competence and School Adjustment (SSCSA; $r = .71$), and the Social Competence Scale of the Home and Community Social Behavior Scales (HCSBS; $r = .74$).

Behavior Rating Inventory of Executive Functioning (BRIEF). The BRI scale of the BRIEF (Gioia, Isquith, Guy, & Kenworthy, 2000) was used as the maximal measure of social competence and was completed by the child's teacher. The BRI includes items that ask teachers questions about the child's capacity to actively suppress or delay approach, to regulate the pace of one's movement, to willingly inhibit forbidden impulses, to delay gratification, to suppress or initiate an activity, and to comply with others' requests (Kochanska, Murray, and Harlan, 2000; Posner & Rothbart, 2007). A study examining EF in children ages three to six who sustained a TBI found that neuropsychological performance tests of EF (Delayed Attention task and Shape School task) had weak relationships with the the BRIEF, but the behavioral ratings on the BRIEF were strongly related to the questionnaire measures of social competence (Ganesalingam et al., 2011). After all, social Competence is a manifestation of behavioral regulation.

Teachers were asked to indicate the frequency the child demonstrates a behavior across a three-point Likert scale ranging from 0 = Never to 2 = Often. The BRI consists of the Inhibit, Shift and Emotional Control scales and represents a child's ability to shift his/her cognitive set and modulate emotions and behaviors. Scores on these scales were summed into a single score and converted to T-scores (M = 50, S.D. = 10). A score 1.5 standard deviations above the mean indicates clinical significance, an abnormally elevated presentation of poor behavioral regulation. Thus, unlike the Social Skills Scales on the SSIS, lower scores indicate better social competence.

The Inhibit scale assesses a child's ability to control impulses and stop behavior at the appropriate time (i.e. "Blurts things out" and "Acts too wild or out of control"). The Shift scale assesses a child's ability to move freely from one activity/situation to another; transition; problem-solve flexibly (i.e. "Acts upset by a change in plans" and "Thinks too much about the same topic"). The Emotional Control scale assesses a child's ability to modulate emotional

responses appropriately (i.e. “Mood changes frequently” and “Has explosive outbursts”). The BRI assesses negative behaviors that impede social competence whereas the SSIS assesses more positive behaviors. The negative wording of the items suggests that there is a clear standard or expectation for behavior that the child is not demonstrating. According to the criteria previously discussed for categorizing items as maximal or typical, the preponderance of items on the BRI approximate maximal performance conditions. The items on these scales refer to behaviors that are externally guided, the appropriate behaviors can be taught, and the appropriate behavior can be prompted by rules or contextual cues.

The Behavior Regulation Index covaries with many commonly used measures of social competence: the ADHD-IV, the Social Problems scale from Child Behavior Checklist (CBCL; $r = .57$, $p < .01$), the Social Problems scale from the Teacher Report Form ($r = .64$, $p < .01$), the BASC, and the Conner’s’ Rating Scale. More specifically, the Behavior Regulation Index correlates strongly with ADHD-IV Hyperactivity-Impulsivity scale (Inhibit, $r = .73$, $p < .01$; Shift, $r = .59$, $p < .01$; and Emotional Control, $r = .56$, $p < .01$). Also, the Inhibit scale correlated strongly with the CBCL Attention Problems ($r = .58$, $p < .01$) and Aggressive Behavior ($r = .73$, $p < .01$) scales, as did Shift ($r = .57$, $p < .01$) and Emotional Control ($r = .67$, $p < .01$) with the CBCL Aggressive Behavior Scale. Very strong relations were found between the Teacher’s Report Form Aggressive Behavior scale and the BRIEF Inhibit ($r = .83$, $p < .01$), Shift ($r = .70$, $p < .01$), and Emotional Control ($r = .81$, $p < .01$).

As reported by the authors of the survey, the averaged internal consistency across the subscales of the BRI was high ($\alpha = .93$) and the test-retest reliability correlation was moderately high for the BRI on the teacher scales ($r = .84$) over a 3.5-week period (Gioia et al., 2000). The moderately high correlation coefficient reflects the expectation that the teacher’s perception of

the behaviors is fairly stable over a period of a few weeks. In the current study, Cronbach's alpha for the teachers' ratings of the students on the BRI was high ($\alpha = .88$) and is comparable to the reliability of the BRI reported by the authors of the BRIEF.

Verbal ability.

Wechsler Preschool and Primary Scale of Intelligence—3rd Edition (WPPSI-III). To control for verbal ability the Wechsler Primary Preschool and Primary Scale of Intelligence—3rd Edition (WPPSI-III), vocabulary subtest, was administered. The split-half reliability is .89, and the test-retest reliability is .84.

Procedure

Permission was received from each school principal before presenting the purpose and details of the study to the parents and teachers of Kindergarten students. Parents who wished to participate completed an informed consent form. Once the consent forms from both the parents and teachers were received, packets containing the CBQ, SSIS, and BRIEF questionnaires were given to each student's teacher. Teachers were typically given two weeks to a month to complete the questionnaires.

The performance measures, including the WPPSI: Vocabulary, NEPSY tasks, and the TAT, were divided among three researchers to administer individually to participants in one-on-one sessions at the schools during the normal school day. Each student was taken individually from his/her classroom and taken to a private, quiet room, to complete the tasks. The length of each session ranged from 20 to 40 minutes depending on the schedule of the particular school. Typically, each child participated in two 30-minute sessions over two days.

Procedure for missing data. When packets were returned with incomplete items, the teachers were contacted via telephone call or email and asked the items in the form of an

interview. On the CBQ-T items that teachers rated as Not Applicable (NA), the items were deleted and replaced with the child's mean score on the particular scale that the item was rated as NA. Two of the effortful control scales of the CBQ-T, Perceptual Sensitivity and Low Intensity Pleasure, were not used because teachers endorsed NA with high frequency. On the TAT, any stories that students could not complete were coded as missing data and replaced with the student's mean score for each scale. One participant was unable to create a story for any of the cards, two participants were unable to create a story for card 3, one participant was unable to create a story for card 13, and one participant was unable to produce a story for card 7. No data was missing on the NEPSY/NEPSY-II, the BRI, or the SSIS.

Procedure for analyzing the results. The sample was evaluated for any nesting effects. Without accounting for nested data, ordinary least squares regression produces standard errors that are too small, leading to a higher probability of rejecting the null hypothesis (Osborne, 2000). To determine if there was any nesting effect, the means and standard deviations of participants' performance on the measures was evaluated according to schools (see Table 12) and intraclass correlations (ICC), measures of the clustering effect, were computed for the variables. The ICC for the SSIS Social Skills scale and the Design Fluency subtest of the NEPSY-II were 0.014 (NS) and 0.184 (NS), respectively. The ICC for the other measures could not be ascertained as the program was unable to converge to a solution. Though the ICCs for the SSIS and the Design Fluency subtest were not significant, the .18 value for the Design Fluency may warrant a model that corrects for nesting effects. In order to avoid results with too small standard errors, a more conservative approach was taken and maximum likelihood with robust errors estimation (MLR) was used to calculate the fit indices and path coefficients.

Three fit indexes, an absolute fit index, an incremental fit index, and a parsimonious fit index, as well as the X^2 statistic were reported for each model. The Standardized Root Mean Squared Residual (SRMR), an absolute fit index, is a standardized summary of the average covariance residuals—the discrepancy between data covariances and covariances implied by the model. The SRMR determines how far the model is from perfect fit. A SRMR value less than .10 indicates adequate fit and when the fit of the model is perfect, the SRMR equals zero. The Comparative Fit Index (CFI), an incremental fit index, indicates the proportion in the improvement of the overall fit of the model relative to a null model. For example, if the CFI is .75, then the relative overall fit of the model is 75% better than that of the null model estimated with the same sample. A CFI value greater than .90 indicates adequate fit. The Root Mean Square Error of Approximation (RMSEA), a parsimonious fit index, indicates how well the model, with unknown but optimally chosen parameter estimates, would fit the population's covariance matrix (Byrne, 1998). The RMSEA is sensitive to the number of estimated parameters in the model, thus the more complex the model, the lower the index value. To interpret the RMSEA values, values less than .05 are considered a close fit, values around .08 are referred to as mediocre fit, and values greater than .10 are considered poor fit (Browne & Cudeck, 1992; MacCallum, Browne, & Sugawara, 1996).

As a note of caution, there are some limitations to all the fit indexes. First, values of fit indexes only indicate the overall or average fit of a model. Second, the fit indexes do not indicate whether the results are theoretically meaningful. Third, good values of fit indexes do not indicate that the predictive power of the model is high. Due to the limitations of the fit indexes, the standardized regression coefficients for each path in the models were compared. To examine the primary hypotheses regarding the effects of performance conditions, the direct path

coefficients were examined between EF and social competence along matched and non-matched theorized performance conditions. The effect size of the path coefficients were interpreted in accordance with Cohen's (1988) guidelines: a small effect size is less than .10; medium is around .30; large effects are coefficients with absolute values of .50 or more. Lastly, to facilitate model comparison and determine model selection, the Akaike information criterion (AIC) was reported. Models were ranked in order of best fitting model according to the models' AIC value; the smaller the AIC value the better the model.

Power Analysis

An a priori power analysis was conducted for the path model (see Table 13) to determine the minimum sample size under conditions regarding the magnitude of effects for the particular path coefficients, correlations, and error variances of the model. Power, broadly defined, is the probability of correctly rejecting a false null hypothesis. The sample size is chosen to keep power close to 0.80, with a significance level of .05. Moderate effects are predicted for all paths that present matched performance conditions.

A Monte Carlo simulation approach (described fully by Muthén & Muthén, 2002) was used to determine the sample size necessary to have sufficient power to realize the primary effects of the subsequent analyses. For this study, the number of subjects is not necessarily allowed to freely vary. Given the constraints of resource limitations and access to participants, the number of subjects was between 50 and 75. As a result, 3 Monte Carlo simulations were performed using the Monte Carlo module within M*plus* at three sample sizes across this range, $N = 50$, $N = 60$, and $N = 75$. The results of the three runs demonstrate that the direct effects have sufficient power to detect path coefficients even at the smallest sample size (n = 50).

Chapter Four: Results

This study employed an observed variable path analysis, a subclass of methods and analyses falling under the general heading of Structural Equation Modeling (SEM), in testing the direct and indirect relations between the CBQ-T and measures of EF and social competence along a continuum of performance conditions with Kindergarten students, while controlling for vocabulary. The advantage of observed variable path analysis is that it tests theoretical models and assesses model fit; however, a disadvantage is that it inherently allows error into the model.

Two sets of recursive, equivalent models were compared and analyzed using MLR with M*plus* (version 6.1, Muthén & Muthén, 2010), commercial software for fitting general structural models. Model 1a is a model with unidirectional effects between the CBQ and measures of EF and social competence along matched performance conditions (Figure 1a). Model 1b is the alternative model; assessing the unidirectional effects between the CBQ-T and measures of EF and social competence along non-matched performance conditions (see Figure 1b). In model 1, the WPPSI: Vocabulary was included as a control variable. A second set of recursive, equivalent models was also computed without the CBQ-T included in the model. Model 1a may not be an adequate test of the primary hypothesis regarding the effects of performance conditions on the relations between measures because the CBQ-T and the measures of social competence share item content and are completed by the same rater. Model 2a is a model with unidirectional effects between measures of EF and social competence along matched performance conditions (Figure 2a), whereas Model 2b examines the relation between measures of EF and social competence along non-matched performance conditions (Figure 2b). In model 2, the WPPSI: Vocabulary was examined as an exogenous variable with unidirectional effects to the

endogenous variables. In the path models, X refers to exogenous variables, Y to endogenous variables, and one headed arrows, →, to direct causal effects.

Properties of the Measures Within this Study

Means and standard deviations of the measures. The means and standard deviations were computed for each measure (see Table 14). Students' mean performance on the WPPSI: Vocabulary subtest was 11.60 (SD = 2.53; range = 5 - 16). Mean scores for teacher ratings on the Attentional Focusing and Inhibitory Control scales on the CBQ-T were 4.90 and 4.85, respectively, on a 7-point Likert scale (SD = 1.18 and 1.25; respectively). Mean scores for the participants' performance across the NEPSY scales ranged from 7.95 to 11.23, with participants mean performance worse for the Design Fluency task and best for the Tower task. Mean scores on the TAT scales were calculated for 61 participants. Level of Abstraction was scored on a four-point scale and had a mean score of 2.55 (SD = .64). Mean scores and standard deviations on the other five scales, which were scored on a five-point scale, ranged from 2.30 (SD = .69) on the Level of Self-Regulation scale to 2.45 (SD = .63) on the Level of Perceptual Integration scale. Teachers' mean rating on the BRI was 54.84 (SD = 15.89) and 101.19 (SD = 13.2) on the SSIS.

Means and standard deviations of the measures varied by school; but were relatively consistent when accounting for the differing sample sizes at each school (see Table 12). The means tended to be comparable, or slightly higher, than the means reported by the authors of the measures, with the exception of the Design Fluency task on the NEPSY-II. Participants from four of the schools in this study performed much lower than the reported mean norms on certain NEPSY-II tasks: one school with two participants performed below the mean on the Auditory

Attention task; participants from four schools performed below the mean on the Design Fluency task; and participants from two schools performed below the mean on the Inhibition task.

Correlations between subscales within a measure. Pearson's correlations were calculated between the subscales or subtests within a measure. The correlation between the CBQ-T effortful control scales, Attentional Focusing and Inhibitory control, was large ($r = .78$, $p \leq .01$), indicating that the scales were highly related. Pearson's correlations for the NEPSY EF tasks were only significant between Auditory Attention and Design Fluency ($r = .38$, $p \leq .01$), Statue and Design Fluency ($r = .31$, $p \leq .01$), and Tower and Statue ($r = .29$, $p \leq .01$; see Table 10). The low and non-significant correlations between several of the tasks suggest that the NEPSY tasks measure EF skills separately. The Pearson's correlations among the scales of the TAT were substantial and significant at the $p \leq .01$ level, ranging from .75, between Associative Thinking and Abstraction, to .91, between Cognitive Experiential Integration and Perceptual Integration (see Table 8), indicating that the scales are highly related.

The subscales that comprise the BRI were also substantially correlated to each other: the Inhibit scale was correlated with both the Attention Shifting and Emotional Control scales ($r = .60$ and .72, $p \leq .01$; respectively); and the Attention Shifting and Emotional Control scales had a large and significant correlation ($r = .86$, $p \leq .01$). Lastly, the subscales that comprise the SSIS Social Skills Scale were all substantially and significantly correlated ($p \leq .01$), ranging from .38 to .87, with the relationship between the communication and assertion scales the lowest and the relationship between communication and responsibility the highest (see Table 15).

Exploratory Analysis

Correlations among the measures with age and gender. The Pearson's correlation between age (in months) and all of the measures was significant for the NEPSY-II Tower task (*r*

= .25) and all of the TAT levels: Level of Abstraction (r = .35), Level of Perceptual Integration (r = .45), Level of Cognitive Experiential Integration (r = .40), Level of Associative Thinking (r = .27), and Level of Self-Regulation (r = .39). The Point Biserial correlation between gender and each of the measures was significantly correlated with the NEPSY statue task and the SSIS Social Skills Scale (see Table 16). In accordance with previous research, girls tended to perform better on tasks requiring inhibition and girls tended to be rated higher on scales of social competence. Lastly, Pearson's correlation was calculated between the WPPSI: Vocabulary and all the variables. Vocabulary was significantly correlated with the NEPSY Auditory Attention and Design Fluency tasks (r = .31 and r = .27; respectively), and vocabulary was substantially correlated with all of the TAT scales and the SSIS Social Skills Scale (see Table 17). The TAT is a language-loaded task that requires the performer to create stories verbally.

Correlations between the measures. Pearson's correlation was calculated between all of the measures. The Effortful Control scales of the CBQ-T (i.e. Attentional Focusing and Inhibitory Control) were significantly correlated ($p \leq .05$) with all of the NEPSY EF scales, the Cognitive Experiential scale of the TAT, and with the BRI and the Social Skills Scale (see Table 18).

The Pearson's correlation for the NEPSY-II Auditory Attention was significantly correlated with the Cognitive Experiential Integration and the Associative Thinking scales of the TAT. Design Fluency was significantly correlated with all of the TAT EF scales. The Statue task was significantly correlated with the Perceptual Integration, the Cognitive Experiential Integration, the Associative Thinking, and the Self-Regulation scales of the TAT. Lastly, the Tower was significantly correlated with the Abstraction, the Perceptual Integration, and the Cognitive Experiential Integration scales of the TAT (see Table 19). In regards to the measures

of social competence, the BRI was only significantly correlated with the Auditory Attention task from the NEPSY-II, whereas the SSIS Social Skills Scale was significantly correlated with both the Auditory Attention and Design Fluency tasks from the NEPSY-II. The BRIEF BRI was not correlated with any of the TAT EF scales, but the SSIS Social Skills Index was significantly correlated with all of the TAT EF scales at the $p \leq .01$ level (see Table 20). Lastly, the Pearson's correlation between the BRI and the SSIS Social Skills Index was substantial ($r = -.49$, $p \leq .01$). The direction of the correlation between the BRI and the SSIS was negative because lower scores on the BRI indicate better social skills and higher scores on the SSIS indicate better social skills.

Lastly, Pearson's correlation and the covariances were calculated for the composite variables used in the path analyses (see Table 21). The CBQ-T Effortful Control variable substantially correlated with the NEPSY EF, the SSIS Social Competence, and the BRI variables ($r = .48, .51, -.45$; $p \leq .01$; respectively), and moderately correlated with the TAT EF variable ($r = .26$, $p \leq .05$).

The NEPSY EF composite variable was substantially correlated with the TAT EF and SSIS Social Competence composites ($r = .42$ and $r = .34$, $p \leq .01$; respectively), and moderately correlated with the WPPSI: Vocabulary and the BRI Social Competence composites ($r = .31$ and $r = -.30$, $p \leq .01$). The relation between the NEPSY and BRI was negative because lower scores on the BRI indicate greater social skills and higher scores on the NEPSY indicate greater EF skills. The TAT EF was substantially correlated with the SSIS Social Competence composite and the WPPSI: Vocabulary task ($r = .40$ and $r = .36$, $p \leq .01$; respectively), but it was not correlated with the BRI Social Competence composite.

The two social competence rating scales, the BRI and the SSIS, were substantially correlated (r = -.50, $p \leq .01$) in the negative direction. The correlation was negative because higher ratings on the SSIS indicate better social skills whereas lower scores on the BRI indicate better social skills. The WPPSI: Vocabulary was significantly correlated with the SSIS variable but not with the BRI (r = .34, $p \leq .05$ and r = -.15; respectively). The substantial correlations between the CBQ-T, the BRI, and the SSIS were expected because they are questionnaire measures with similar item content and are completed by the same rater. In accordance with the hypotheses, the TAT correlated with the SSIS and not the BRI; but, the NEPSY, correlated with both the BRI and the SSIS.

Path Analysis

This section contains the results of the two sets of non-recursive, equivalent path analyses.

Model 1. The analyses described next concern the recursive, equivalent models that examined the relations between the CBQ-T and measures of EF and social competence along varying performance conditions. Model 1a examined the direct effects of the CBQ-T on the measures of EF and social competence and the direct effects of matched performance conditions on measures. Estimates for model 1a are presented in Figure 5.1. The unstandardized path coefficient for the direct effect of the CBQ-T on the NEPSY was statistically significant (.76, $p \leq$ .00), and the corresponding standardized path coefficient was appreciable (.44, SE = .09). On the other hand, the unstandardized path coefficient for the direct effect of the CBQ-T on the TAT was not statistically significant, (.10, p = .22) and the corresponding standardized path coefficient was moderate (.19, SE = .15). The unstandardized path coefficients for the direct effects of the CBQ-T on the measures of social competence were statistically significant (BRI =

-5.40, $p \leq .01$; SSIS = 4.91, $p \leq .00$), and the corresponding standardized path coefficients were appreciable (BRI = -.39, SE = .12; SSIS = .41, SE = .15). These results support the hypothesis that the CBQ-T directly influences performance on the BRI and SSIS.

The unstandardized path coefficient for the direct effect of the NEPSY on the BRI was not statistically significant (-.86, $p = .62$), and the corresponding standardized path coefficient was small (-.11, SE = .22). On the other hand, the unstandardized path coefficient for the direct effect of the TAT on the SSIS was statistically significant (5.63, $p \leq .05$), and the corresponding standardized path coefficient was moderate (.24, SE = .10). The effects between the measures of EF and social competence may be small to moderate due to the appreciable effects between the CBQ-T and the measures of social competence. All the parameter estimates, standard errors, and t values are presented in Table 22.

Model 1b is an equivalent model of 1a, but it examined the direct effects of measures of EF on measures of social competence along non-matched performance conditions. Estimates for model 1b are presented in Figure 5.2. The unstandardized path coefficients for the direct effect of the CBQ-T on the NEPSY and TAT were the same as in Model 1a. The unstandardized path coefficients for the direct effects of the CBQ-T on the measures of social competence were statistically significant (BRI = -6.41, $p \leq .00$; SSIS = 5.43, $p \leq .00$), and the corresponding standardized path coefficients were appreciable (BRI = -.46, SE = .09; SSIS = .46, SE = .18). The unstandardized path coefficients for the direct effect of the NEPSY on the SSIS (.04, $p = .97$) was not statistically significant and the corresponding standardized path coefficients was small (.01, SE = .16); but, the direct effect of the TAT on the BRI (3.64, $p = .02$) was statistically significant and the corresponding standardized path coefficients was small (.13, SE = .06). The relation between the BRI and the TAT may be significant because any real behavior as rated by

the teacher on the BRI is more typical than the maximal, discrete measurement of EF by the NEPSY. Overall, the CBQ-T explained more variance in the measures of social competence because the relations between measures of non-matched performance conditions the effects were small. All the parameter estimates, standard errors, and t values are presented in Table 23.

To determine model fit, the chi-squares and selected fit indices of the two models were examined. The fit hypothesis for Model 1a was retained (X^2 (2) = .19, p = .91). For Model 1a, the values of the absolute fit index (SRMR = .01), the incremental fit index (CFI = 1.00), and the parsimonious fit index (RMSEA = .00) for Model 1a indicate adequate fit. The fit indicators for Model 1b were worse (X^2 (2) = 2.33, p = .31). For Model 1b, the values of the absolute fit index (SRMR = .05) and the incremental fit index (CFI = .99) indicate adequate fit, but the parsimonious fit index was mediocre (RMSEA = .05). The X^2 and the SRMR and CFI values for Model 1b were adequate because of the appreciable direct effect of the CBQ-T and the measures of social competence. According to the RMSEA values, Model 1a with matched performance conditions was more parsimonious than Model 1b with non-matched performance conditions. The AIC value for the matched performance conditions (Model 1a = 1826.91) was smaller than the AIC value for the non-matched performance conditions model (Model 1b = 1831.56), indicating that Model 1a was the preferred model. As hypothesized, the matched performance conditions model was the better model.

Model 2. The analyses described next concern the recursive, equivalent models that examined the direct effects of performance conditions, with vocabulary as the exogenous variable. Model 2a examined the direct effects of matched performance conditions between measures of EF and social competence. Estimates for model 2a are presented in Figure 6.1. The unstandardized path coefficient for the direct effect of the WPPSI: Vocabulary was statistically

significant for the TAT (.09, $p \leq .01$) and the NEPSY (.25, $p \leq .05$), with medium standardized path coefficients (TAT = .36, SE = .08 and NEPSY = .31, SE = .12). The unstandardized path coefficient for the direct effect of the WPPSI: Vocabulary on the BRI and the SSIS were not significant and the effect sizes were small. The unstandardized path coefficient for the direct effect of the NEPSY on the BRI was not significant (-1.62, $p = .25$) and the corresponding standardized path coefficient (-.21, SE = .19) was moderate, but greater than when the CBQ-T was included in the model. The unstandardized path coefficient for the direct effect of the TAT on the SSIS (7.27, $p \leq .01$) was statistically significant, and the corresponding standardized path coefficient (.32, SE = .06) was moderate. All the parameter estimates, standard errors, and t values are presented in Table 24.

Model 2b is an equivalent model of 2a, but it examined the direct effects of measures of EF on measures of social competence conceived along non-matched performance conditions. Estimates for model 2b are presented in Figure 6.2. The unstandardized path coefficients for the direct effect of the WPPSI: Vocabulary on the NEPSY and TAT were the same as in Model 2a. The unstandardized path coefficients for the direct effects of the WPPSI: Vocabulary on the BRI was not significant (-1.12, $p = .83$), and the corresponding standardized path coefficient was small (-.18, SE = .13). Also, the unstandardized path coefficient for the direct effect of the WPPSI on the SSIS was not statistically significant (1.61, $p = .09$), and the corresponding standardized path coefficient was moderate (.30, SE = .16). The unstandardized path coefficients for the direct effect of the NEPSY on the SSIS (.81, $p = .44$) and the TAT on the BRI (2.10, $p = .53$) were not significant, and the corresponding standardized path coefficients were small (SSIS = .12, SE= .16 and BRI = .08, SE = .13). After removing the suppressing effect of the CBQ-T, the results indicate that the performance conditions of the measures affect the relations between

the measures of EF and social competence. All the parameter estimates, standard errors, and t values are presented in Table 25.

To determine model fit, the chi-squares and selected fit indices of the two models were compared. The fit hypothesis for Model 2a was retained (X^2 (2) = 1.42, p = .49). The values of the absolute fit index (SRMR = .04), the incremental fit index (CFI = 1.00), and the parsimonious fit index (RMSEA = .00) for Model 2a indicate adequate fit. The fit for Model 2b was worse than the fit for Model 2a, with a X^2 trending towards significance (X^2 (2) = 5.52, p = .06). For Model 2b, the absolute fit index (SRMR = .09) indicates adequate fit, but this model is further from perfect fit than Model 2a. The incremental fit index (CFI = .92) also indicates adequate fit, but Model 2a is 100% better than the null model compared to only 92% better. The parsimonious fit index (RMSEA = .17) indicated poor fit and Model 2a was the more parsimonious model. The AIC value for the matched performance conditions without the measure of temperament (AIC = 1360.50) was smaller than the non-matched performance conditions without the measure of temperament (AIC = 1368.48), and the smallest of all four models. Thus, Model 2a, with matched performance conditions between measures of EF and social competence, was the preferred model. These results support the hypothesis that the performance conditions of measures influence the relations among them.

Chapter Five: Discussion

This study employed an observed variable path analysis to examine the effects performance conditions have on the relations between measures of EF and social competence. It was hypothesized that models measuring EF and social competence with matched performance conditions would have a non-significant X^2 value, the direct path coefficients would have significant and moderate effect sizes, and the AIC value would be smaller than the AIC value for the non-matched models. It was also hypothesized that models measuring EF and social competence with non-matched performance conditions would have a significant X^2 value, the direct path coefficients would have small effect sizes, and the AIC values would be larger than the matched models.

Model 1 assessed the unidirectional effects between the CBQ-T and measures of EF and social competence. Model 1a examined these relations when EF and social competence were measured along matched performance conditions, whereas Model 1b assessed these relations when EF and social competence were measured along non-matched performance conditions. For models 1a and 1b, the direct paths from the CBQ-T to the measures of EF were only significant for the NEPSY. The EF items on the NEPSY parallel the conceptualization of effortful control on the CBQ-T. The substantial and significant relation between the NEPSY and the CBQ-T suggests that effortful control may not be context-free and that performance conditions may apply to items on temperament surveys. The CBQ-T did not have a significant relation with the TAT possibly because the TAT assesses emotionality and the CBQ-T does not assess emotionality.

Both models 1a and 1b indicated that effortful control, as measured by the CBQ-T, substantially contributes to the expression of social competence, as measured by both the BRI

and the SSIS. However, the direct effect between the CBQ-T and the measures of social competence was higher in the non-matched conditions model because the direct effect from the NEPSY and the TAT to the measures of social competence was smaller due to the non-matched conditions.

In regards to testing the performance conditions of Model 1, the matched performance conditions model (1a) was a better fit to the data than the non-matched performance conditions model (1b). In Model 1a, the direct effect from the TAT to the SSIS was moderate and significant. The direct path from the NEPSY to either the BRI or the SSIS was not significant, indicating that EF assessed under maximal conditions does not translate to the social world. Any real behavior is more typical than the discrete skills examined by the NEPSY. In the non-matched conditions model, the direct effect between the TAT and the BRI was significant but it was a small effect size, indicating that the social competence items on the BRI present less maximal conditions than the NEPSY tasks.

Model I was not an adequate test of the primary hypothesis regarding the effects of performance conditions because the CBQ-T and the measures of social competence share item content and were completed by the same rater. As a result, a second set of recursive, equivalent models were computed without the CBQ-T in the model. This provided a focused examination of the effects performance conditions exert on the relation between measures of EF and social competence. Model 2a examined the direct effects between measures of EF and social competence along matched performance conditions, whereas Model 2b examined the relations along non-matched performance conditions.

As hypothesized, the relation between EF and social competence when both were measured along typical performance conditions was in the proposed direction and had moderate

effect sizes. The maximal path from the NEPSY to the BRI was not significant, but it did have moderate effect sizes as hypothesized. After removing the CBQ-T, the strength and direction of the paths between the typical measures of EF and social competence were as hypothesized, and the maximal measures were trending towards the proposed direction. Furthermore, the effect size between the maximal measure of EF and the maximal measure of social competence nearly doubled when the CBQ-T was excluded from the model. This is most likely because the CBQ-T is theoretically similar to the maximal measure of EF and substantially correlated with the BRI; thus, the CBQ-T explains a significant amount of the variance in the BRI.

The relations between the measures of EF and social competence were not significant in non-matched conditions model. The NEPSY was not significant with either measure of social competence, indicating that the NEPSY tasks assess very discrete skills under optimal conditions, which do not translate to social behavior. However, the model improved when the NEPSY and the BRI were measured along the same path. The effect sizes decreased substantially when the constructs were measured along non-matched performance conditions. In the non-matched model, vocabulary had greater direct effects on social competence than in the matched model because the effects of the NEPSY and TAT were not significant, suggesting that non-matched performance conditions of measures predict different behaviors and cannot be used interchangeably with the other measures when assessing behavior.

Both matched models (Model 1a and 2a) had adequate fit, and had better fit than the non-matched models (Model 1b and 2b). In Model 1a, the direct pathway along the typical performance conditions was significant. Despite a small sample size, these findings were replicated and became stronger when the measure for effortful control was removed from the model. Model 2a was the clearest evidence indicating that measures of EF and social

competence differentially relate based on the performance conditions of the measure. This has significant implications for theory and clinical practice.

Though the NEPSY and TAT are both categorized as measures of EF, the measures differentially predict social competence. The TAT predicts social competence on the SSIS because the two measures assess constructs under the same conditions. Currently, there is no model linking the TAT to EF. Thus, the conceptualization and measurement of EF should be expanded to include a social component. EF is utilized in a social environment, and that social environment requires children to integrate multiple pieces of information, monitor the environment for feedback, and initiate and maintain behavior in an ever-changing environment. The NEPSY measures EF skills separately and the results may underestimate any EF disabilities a child is experiencing navigating everyday tasks, or overestimate the difficulties because the measure is unable to assess any compensatory skills (Gioia & Isquith, 2004).

Similar to Sackett et al. (1988) findings that performance conditions of tasks differentially predict work productivity, the significant relation between the typical measures and the trending relation between the maximal measures suggest that performance conditions of measures differentially predict behavior. In practice, these measures cannot be used interchangeably to assess EF or social competence. The assessor should interpret the results of these measures according to their performance conditions. EF or social competence assessed with a measure that presents typical performance conditions evaluates how the child simultaneously integrates multiple pieces of information, monitors the environment, problem-solves, and acts independently. On the other hand, EF or social competence assessed with measure that presents maximal performance conditions evaluates what a child can do with supports and evaluates each skill separately. In the assessment process, it is beneficial to utilize

measures that present maximal and typical performance conditions. The typical performance conditions will inform how the child is functioning when he/she is required to integrate all the necessary EF and social skills to navigate the classroom environment independently without cues, and the maximal performance conditions informs how the child's performance improves when provided with supports such as directions, prompts, practice items, and clear performance expectations.

Though there was enough power, a significant limitation to this study was the small sample that was not very representative of the United States population. Even with the small sample size, however, the relations between the measures were in the hypothesized direction. This warrants further investigation into the effects performance conditions have in conceptualizing a construct and the relations between measures of differing constructs. This study should be replicated with a larger sample size that is more representative of the U.S. population and future studies should examine the effects of performance conditions with other constructs. Another limitation of this study was the measures used to assess social competence. The SSIS and the BRI did not present solely typical or maximal performance conditions; rather, the majority of the items were characterized as either typical or maximal. These surveys were used in this study because they are commercially available and they are frequently used in the assessment of social competence for school readiness. Future studies may consider developing surveys in the same manner Lalonde and Chandler (1995) did to examine "Intentional" and "Conventional" social competence. Items could be drawn from a variety of surveys to create a solely typical or solely maximal survey to measure social competence. The results of this study indicate that performance conditions need to be considered in the development of surveys.

Another measurement limitation is the use of Cronbach's Alpha as the measure of reliability. Alpha is a function of the extent to which items on a scale have high commonalities and thus low uniqueness: It is a function of interrelatedness. Theoretically, a large alpha should indicate that differences in scores on a test are the result of group, or individual, factors and not due to item-specific variance (Cortina, 1993; Streiner, 2003). However, Cronbach's alpha may not be an accurate measure of reliability.

There are several problems with using alpha as a measure of reliability. Primarily, if the group being tested differs from the group used to establish reliability, the alpha will most likely be different. This problem impacted the scales used from the CBQ-T to assess effortful control in Kindergarteners. A previous study reported alpha with a pre-school sample, and the alpha values for the CBQ-T scales were different from the values yielded by the Kindergarten sample. Thus, different effortful control scales were used with the Kindergarten sample than with the pre-school sample. Also, the length of the test affects alpha: lots of items can increase alpha despite low item intercorrelations and multidimensionality. Authors of measures should consider these limitations and utilize alternative strategies to measure reliability. For example, linear structure equation modeling, nonlinear structure equation modeling, and greatest lower bound have been recommended as possible alternative to coefficient alpha (Green & Yang, 2009; Sijtsma, 2009).

Lastly, future studies should examine the conceptualization of temperamental effortful control. The significant relation between temperamental effortful control and the maximal measure of EF suggests that performance conditions may apply to the items on the CBQ-T. After conducting this study, it appears that some items on the CBQ-T could represent typical or maximal performance conditions because the item presents a context in which the teacher must rate the student.

Table 1 *Dimensions of Effortful Control as Measured by the Children's Behavior Questionnaire*

Scale	Definition	Example Items from CBQ
Attentional Focusing	Tendency to maintain attentional focus upon task-related channels.	-When practicing an activity, has a hard time keeping her/his mind on it. -When drawing or coloring in a book, shows strong concentration.
Inhibitory Control	The capacity to plan and to suppress inappropriate approach responses under instructions or in novel or uncertain situations.	-Can wait before entering into new activities if s/he is asked to. -Has trouble sitting still when s/he is told to (story time, at movies, church, etc.)
Low Intensity Pleasure	Amount of pleasure or enjoyment related to situations involving low stimulus intensity, rate, complexity, novelty, and incongruity.	-Enjoys quiet, soothing activities. taking warm baths. -Enjoys just being talked to.
Perceptual Sensitivity	Awareness of slight, low intensity stimulation arising from within the body and the environment.	-Seems to listen to even quiet sounds. -Is quickly aware of some new items in the room.

Note. Adopted from Putnam, S.P. & Rothbart, M.K. (2006). Development of short and very short forms of the Children's Behavior Questionnaire. Journal of Personality Assessment, *87,* 103-113.

Table 2 *Different Conceptualizations of Social Competence as a Construct*

Reference	Definition
Bohlin, G., Hagekull, B. & Anderson, K. (2005).	Social competence is the ability to coordinate resources in order to reach adaptive goals.
Bierman & Welsh (1997) (p. 332)	Social competence it the ability to be sensitive and responsive to the situation and the social cues of other individuals involved in the interaction.
Cummings, K.D. & Kaminski, R.A. (2008).	Social competence is a two-fold construct wherein socially competent individuals have repertoires of socially appropriate behaviors as well as sufficient problem-solving skills that allow them to choose and enact behaviors. Based on specific behaviors that reliably predict important social outcomes.
Ewart, C.K, Jorgensen, R.S., Suchday, S., Chen, E., & Matthews, K.A. (2002).	Social competence is the ability to select and pursue desired, attainable goals by achieving control over one's actions and emotions by understanding, connecting with, and influencing other people.
Ford, M.E. (1982).	Social competence is the attainment of relevant social goals in specified social contexts, using appropriate means and resulting in positive developmental outcomes.
Kagan, J. (1986).	The cognitive unit that will store experience in a form so faithful a person can recognize a past event.
Nienow, T.M., Docherty, N.M., Cohen, A.S., & Dinzeo, T.J. (2006).	Social Competence includes 3 skills: receiving, processing, and sending skills. Individuals have to be able to identify the problem, process the information, and choose the appropriate response, which involves planning, goal setting, inhibition, and self-regulation.
Rubin and Rose-Krasnor (1992).	Social competence is the ability to achieve personal goals while maintaining positive relationships reflects both self and other orientations. Social interactions require a

	balance between self and other focus.
Saltzman-Benaiah, J. & Lalonde, C.E. (2007).	Social competence has five content areas-false belief, interpretive theory of mind, display rules, making personalized inferences about thoughts and making personalized inferences about emotions.
Vaughan Van Hecke, A., Mundy, P.C., Acra, C.F., Block, J.J., Delgado, C.E.F., Parlade, M.V., Meyer, J.A., Neal, A.F., & Pomares, Y.B. (2007).	Social competence involves at least 3 dimensions of behavior: tendency to express agreeableness, interest in others, and positive emotions with peers and adults. It is the ability to integrate the behavior of self with others in social interaction; the ability to regulate attention and emotional reactivity, including the ability to self-monitor and correct errors, in positive goal-related activity.
Yeates & Selman (1989) (p.66).	Social competence is the development of the social-cognitive skills and knowledge including the capacity for emotional control, to mediate behavioral performance in specific contexts, which in turn are judged by the self and others to be successful and thereby increase the likelihood of positive psychosocial adjustment.

Table 3 *Different Conceptualizations of Executive Functioning as a Construct*

Reference	Definition
Anderson (1989).	EF is an umbrella term encompassing a number of interrelated sub-skills necessary for purposeful, goal-directed activity.
Carlton, Moses, & Brenton (2002).	EF is heterogeneous skills that aid in the monitoring and control of thought and action.
Denckla (1994).	The critical features of EF for active problem solving are as follows: providing for delayed responding, future-oriented, strategic action selection, intentionality, anticipatory set, freedom from interference, and the ability to sequence behavioral outputs.
Frontotemporal Dementia (1998).	EF has two dimensions: -Organization- attention, planning, sequencing, problem solving, working memory, cognitive flexibility, abstract thinking, rule acquisition, selecting relevant sensory information. - Regulation- initiation of action, self-control, emotional regulation, monitoring internal and external stimuli, initiating and inhibiting context-specific behavior, moral reasoning, decision-making.
Gioia, G.A. & Isquith, P.K. (2004).	EF is the coordination of one's cognitive and behavioral capacities with real-world demand situations. It is a collection of related yet distinct abilities that provide for intentional, goal-directed, problem-solving action.
Hughes & Graham (2002).	EF is an umbrella term for all of the complex set of cognitive processes that underlie flexible goal-directed responses to novel or difficult situations. EF is held to be necessary in situations that involve: a) planning and decision making; b) error correction or troubleshooting; c) initiation of novel sequences of action; d) danger or technical difficulty; or e) the need to overcome a strong habitual response.
Pennington & Ozonoff (1996).	The ability to inhibit impulses, shift attention

	from one task to another, plan, initiate tasks, and utilize working memory are sub-skills considered to be components of EF.
Morgan & Lilienfeld (2000).	EF consists of abilities needed to achieve and maintain a problem-solving set, and includes such processes as planning, organizational skills, selective attention and inhibitory control and optimal cognitive set maintenance.
Pennington, Bennetto, McAleer & Roberts, (1996).	EF includes the abilities to initiate behavior, inhibit competing actions or stimuli, select relevant task goals, plan and organize a means to solve complex problems, shift problem-solving strategies flexibly when necessary, and monitor and evaluate one's own behavior. The working memory capacity to hold information actively "online" in the service of problem solving is also described within this domain of functioning.
Senn, Espy, & Kaufmann (2004); Welsh, Pennington, & Groiseer (1991); Levin & Hanten (2005); Lezak (2004).	EF refers to a set of higher order regulatory capacities including attentional control, inhibition, working memory, goal setting, planning, problem solving, mental flexibility, and abstract reasoning (Senn, Espy, & Kaufmann, 2004; Welsh, Pennington, & Groiseer, 1991) that enable goal-directed behavior (Levin & Hanten, 2005; Lezak, 2004)
Stuss & Benson (1986).	EF is a set of related capacities for intentional problem solving including anticipation, goal selection, planning, monitoring, and use of feedback. Their hierarchical model highlights important aspects of the executive functions that relate to the highest levels of cognition, including anticipation, judgment, self-awareness, and decision making.
Welsh and Pennington (1988) (p.201).	EF is "the ability to maintain an appropriate problem-solving set for attainment of a future goal."

Table 4 *Item criteria to determine performance conditions of social competence surveys*

Maximal	Typical
Awareness that behavior is monitored	Behavior requires the appropriate interpretation of a social situation
Behavior externally guided	Behavior integrates own emotions and the needs of others
The behavior can be taught or role played	Behavior is self-initiated
Context presents cues that prompt a specific behavior	Behavior is appropriate to the context
Rules govern behavior/clear expectations for behavior	Behavior integrates Theory of Mind and problem-solving

Table 5 *NEPSY/NEPSY-II tasks*

NEPSY Attention & Executive Functioning Domain subtests	Maximal Conditions	Designed to Assess	Task
Auditory Attention	-Directions are repeated -Three practice trials if needed	selective auditory attention and the ability to sustain attention	The child's behavior is rated according to the number of correct responses to the target word and the number errors, either of omission or commission. The errors of omission are interpreted as a manifestation of inattention and errors of commission are interpreted as a manifestation of inhibitory control
Design Fluency	Directions can be repeated -2 demonstrations to model the task -2 practice items	visual perceptual speed, self-monitoring, and retrieval fluency	The child draws as many designs as he or she can on each array within a specified time limit
Inhibition	-Practice items	Ability to inhibit automatic responses in favor of novel responses and the ability to switch between response types. The Naming task of the Inhibition subtest assesses attentional control and self-monitoring, while the Inhibition task	First, the Naming task requires the child to look at a series of black and white shapes and names the shape, then the child looks at a series of arrows and names the direction. Second, the Inhibition task required the child to look at a series of shapes or arrows

		requires the participant to inhibit a previously acquired association in order to perform the task	and names the opposite shape or direction, depending on the color of the shape or direction of the arrow.
Statue	Assessor corrects child's behavior during the performance	motor persistence and inhibition	The child is asked to maintain a body position with eyes closed during a 75-second period and to inhibit the impulse to respond to sound distracters (Korkman, Kirk, & Kemp, 2007)
Tower (NEPSY)	-Repeat directions -Practice demonstration and trial -assessor corrects child during task	planning, strategizing, and monitoring performance in rule-based nonverbal problem solving	arranging colored balls on pegs to match a picture stimulus in a certain number of moves and within time limits

Note. The skills the tasks are designed to assess was adopted from Korkman, M., Kirk, U., & Kemp, S. (2006). NEPSY: A Developmental Neuropsychological Assessment. San Antonio, TX: Psychological Corporation, and Korkman, M., Kirk, U., & Kemp, S. (2007). NEPSY- II: A Neuropsychological Assessment- Second Edition. San Antonio, TX: Psychological Corporation.

Table 6 *TAT Levels*

Level	Scoring	EF skills measured
Level of Abstraction	the degree of abstract thinking evidenced in the story the narrator creates	Indicator of flexibility in thinking, which enables individuals to consider multiple solutions, alternatives to solve a problem, make inferences, and adjust thoughts, intentions, goals, and actions according to varying demands or changes in goals
Levels of Cognitive and Experiential Integration	Narrator's ability to consider the consequences and alternative solutions while balancing short- and long-term goals with the needs of others, ability to place events in a context and within the appropriate time-frame	Abilities to plan, monitor, develop goals, and self-monitor.
Levels of Associative Thinking	Narrator's ability to organize ideas to create a flowing story, keep the story on topic, and avoid the inclusion of irrelevant details.	Ability to self-monitor, sustain attention, and inhibit off-task or inappropriate associations
Levels of Self-Regulation	Narrator's ability to coordinate goals and actions, adapt responses after evaluating the immediate feedback, shift attention from focusing on the immediate feedback to considering long-term goals and consequences, and appropriately updating schemas in working memory	Indicator of self-monitoring, working memory, planning and developing goals, problem-solving

Note. Scoring criteria for the levels was adopted from Teglasi, H. (2012). *Essentials of TAT and other story telling assessments, Second Edition*. New York: Wiley.

Table 7 *Items in the CBQ-T Effortful Control Scale Answered as Not Applicable*

Scale (Number of Items on Scale)	Item Left Incomplete	Number of Times Item Answered as Not Applicable
Attentional Focusing (6)	71. When building or putting something together, becomes very involved in what s/he is doing, and works for long periods.	1
	89. Sometimes becomes absorbed in a picture book and looks at it for a long time.	1
Inhibitory Control (6)	45. Plans for new activities or changes in routine to make sure s/he has what will be needed.	5
	73. Approaches places that s/he thinks might be "risky" has been told are dangerous slowly and cautiously.	9
Low Intensity Pleasure (8)	39. Enjoys "snuggling up" next to an adult or sitting on adult's lap next to a parent or babysitter.	12
	72. Likes being sung to.	21
	76. Likes the sound of words, such as nursery rhymes.	7
	86. Enjoys sitting on adult's lap.	30
	94. Enjoys gentle rhythmic activities, such as rocking or swaying.	24
Perceptual Sensitivity (6)	5. Notices the smoothness or roughness of objects s/he touches.	11
	13. Notices it when others are wearing new clothing.	6

24. Seems to listen to even quiet sounds.	5
32. Comments when someone (teacher, classmate) a parent has changed his/her appearance.	6
47. Is quickly aware of some new item in the room.	2
83. Doesn't usually notice odors, such as perfume, smoke, cooking, etc.	19

Note. Items answered as NA were treated as missing data. The missing data was substituted with the subjects mean score on the particular scale that the item was missing.

Table 8 *Correlations between TAT Executive Functioning Scales (N = 61) (Partial Correlation Controlling for Vocabulary)*

	Level of Abstraction	Level of Perceptual Integration	Level of Cognitive Experiential Integration	Level of Associative Thinking	Level of Self-Regulation
Level of Abstraction	1	.85** (.82**)	.82** (.80**)	.74** (.71**)	.84** (.83**)
Level of Perceptual Integration		1	.91** (.90**)	.86** (.84**)	.89** (.88**)
Level of Cognitive Experiential Integration			1	.88** (.87**)	.90** (.89**)
Level of Associative Thinking				1	.86** (.85**)
Level of Self-Regulation					1

Note. * $p \leq .05$; ** $p \leq .01$

Table 9 *Principal Axis Factor Analysis of TAT EF Scales*

	Initial
Level of Abstraction	.76
Level of Perceptual Sensitivity	.88
Level of Cognitive Experiential Integration	.88
Level of Associative Thinking	.81
Level of Self-Regulation	.87

Total Variance Explained			
Component	Total	Percent of Variance	Cumulative Variance
1	4.43	88.50	88.50
2	.27	5.31	93.81
3	.12	2.36	96.16
4	.11	2.13	98.29
5	.09	1.71	100.00

Table 10 *Pearson's Correlations among NEPSY tasks (Partial Correlation Controlling for Vocabulary)*

	Auditory Attention	Design Fluency	Inhibition	Statue	Tower
Auditory Attention	1	.38** (.33**)	.25 (.22)	.10 (.07)	.19 (.17)
Design Fluency		1	.24 (.21)	.31** (.29*)	.15 (.13)
Inhibition			1	.20 (.19)	-.01 (-.02)
Statue				1	.29* (.28*)
Tower					1

Note. * $p \leq .05$; ** $p \leq .01$

Table 11 *Principal Axis Factor Analysis of NEPSY EF Subtests*

	Initial
Auditory Attention	.20
Level of Perceptual Sensitivity	.23
Level of Cognitive Experiential Integration	.11
Level of Associative Thinking	.18
Level of Self-Regulation	.12

Component	Initial Eigen values			
	Total	Percent of Variance	Cumulative Variance	Rotation Sums of Squared Loadings
1	1.87	37.30	37.30	1.09
2	1.06	21.18	58.47	.990
3	.87	17.31	75.78	
4	.71	14.14	89.92	
5	.50	10.08	100.00	

Table 12 *Means of Variables According to Schools*

Measure	Schools							
	CYC (n = 19) M (SD)	OLPH (n = 21) M (SD)	Woods (n = 8) M (SD)	Oneness (n = 5) M (SD)	S.C. (n = 1) M(SD)	Kenilworth (n = 1) M (SD)	New Hope (n = 2) M (SD)	Merrit (n = 5) M(SD)
WWPSI	11.37 (2.99)	12.00 (1.64)	11.63 (3.34)	11.80 (2.17)	12.00	12.00	9.50 (2.54)	11.20 (3.56)
Attentional Focusing	4.99 (1.18)	4.74 (1.38)	4.41 (1.17)	4.77 (.69)	6.00	6.83	5.83 (.71)	5.20 (.34)
Inhibitory Control	4.88 (1.29)	4.81 (1.32)	4.69 (1.43)	4.75 (1.07)	6.00	6.50	4.43 (1.66)	4.83 (.99)
Low Intensity Pleasure	4.92 (.57)	4.82 (.67)	4.46 (.61)	5.27 (.62)	5.77	6.43	4.32 (.68)	5.03 (.46)
Perceptual Sensitivity	4.36 (.96)	4.50 (1.08)	4.60 (1.00)	4.67 (.98)	5.33	5.67	5.32 (.31)	5.10 (.61)
Auditory Attention	9.63 (3.32)	10.62 (3.28)	9.87 (4.12)	9.80 (2.23)	10.00	16.00	6.00 (2.83)	9.20 (3.11)
Design Fluency	7.11 (2.77)	9.71 (2.69)	5.63 (3.16)	9.00 (4.36)	6.00	10.00	9.00 (2.83)	6.00 (2.55)
Inhibition	7.11 (4.27)	8.38 (4.47)	9.50 (3.12)	12.00 (1.23)	10.00	10.00	11.00 (2.83)	9.60 (3.65)
Statue	10.63 (3.42)	10.62 (2.66)	9.63 (2.88)	10.00 (3.32)	12.00	14.00	12.50 (2.12)	10.80 (3.77)
Tower	11.21 (2.51)	11.67 (2.54)	11.75 (1.99)	9.60 (3.36)	9.00	8.00	13.00 (.00)	10.40 (5.03)
Level of Abstraction	2.75 (.70)	2.68 (.65)	2.23 (.65)	1.90 (.82)	2.00	2.00	3.00 (.24)	2.43 (.41)
Level of Perceptual	2.58 (.62)	2.60 (.63)	2.25 (.51)	2.07 (.45)	1.50	1.67	3.08 (.59)	2..10 (.67)

Integration								
Level of Cognitive Experiential	2.44 (.66)	2.45 (.65)	2.17 (.42)	1.83 (.57)	1.50 (	1.67	3.00 (.71)	2.27 (.56)
Level of Associative Thinking	2.49 (.56)	2.45 (.68)	2.19 (.39)	2.17 (.25)	1.83	2.17	2.75 (.12)	2.27 (.53)
Level of Self-Regulation	2.37 (.72)	2.50 (.75)	2.08 (.45)	1.73 (.64)	1.50	1.50	2.83 (.24)	2.00 (.49)
BRIEF BRI	55.11 (18.14)	53.90 (16.10)	53.25 (10.33)	68.00 (19.75)	44.00	47.00	48.00 (8.49)	53.60 (13.48)
SSIS Social Skills Index	100.16 (12.60)	105.05 (15.02)	96.38 (17.05)	94.00 (8.515)	107.00	106.00	112.50 (3.54)	97.20 (10.47)

Note. SD = Standard Deviation

Table 13 *Power Analysis*

Model Results For $N = 50$							
Population	Estimates	Avg	S.D.	S.E.	M.S.E.	95% Cover	%Sig Coeff
Y1	ON						
X1	0.250	0.2514	0.0748	0.0724	0.0056	0.941	0.920
X2	0.250	0.2463	0.0887	0.0829	0.0079	0.934	0.825
X3	0.100	0.1008	0.0850	0.0831	0.0072	0.939	0.247
Y2	ON						
X1	0.250	0.2516	0.0762	0.0724	0.0058	0.921	0.928
X3	0.250	0.2511	0.0908	0.0830	0.0082	0.932	0.825
X2	0.100	0.1000	0.0855	0.0830	0.0073	0.940	0.257
X2	ON						
X1	0.250	0.2542	0.1184	0.1157	0.0140	0.950	0.598
X3	ON						
X1	0.250	0.2518	0.1183	0.1155	0.0140	0.941	0.591
X2	WITH						
X3	0.100	0.1004	0.0933	0.0921	0.0087	0.956	0.164
Y1	WITH						
Y2	0.200	0.0936	0.0343	0.0321	0.0125	0.156	0.894
Means							
X1	0.000	0.0056	0.1408	0.1394	0.0198	0.940	0.060
Intercepts							
X2	0.000	0.0012	0.1149	0.1141	0.0132	0.953	0.047
X3	0.000	0.0000	0.1154	0.1140	0.0133	0.941	0.059
Y1	0.000	-0.0019	0.0692	0.0661	0.0048	0.934	0.066
Y2	0.000	-0.0035	0.0688	0.0660	0.0047	0.935	0.065
Variances							
X1	1.000	0.9809	0.1915	0.1962	0.0370	0.921	1.000
Residual Variances							
X2	0.675	0.6448	0.1337	0.1290	0.0188	0.892	1.000
X3	0.675	0.6431	0.1329	0.1286	0.0187	0.891	1.000
Y1	0.225	0.2074	0.0452	0.0415	0.0024	0.840	1.000
Y2	0.225	0.2069	0.0414	0.0414	0.0020	0.863	1.000

For $N = 60$

Y1	ON						
X1		0.250	0.2506	0.0690	0.0662	0.0048	0.935	0.956
X2		0.250	0.2460	0.0785	0.0759	0.0062	0.945	0.878
X3		0.100	0.1016	0.0735	0.0756	0.0054	0.953	0.277
Y2	ON						
X1		0.250	0.2511	0.0668	0.0662	0.0045	0.937	0.953
X3		0.250	0.2522	0.0796	0.0756	0.0063	0.933	0.875
X2		0.100	0.0974	0.0800	0.0760	0.0064	0.943	0.272
X2	ON						
X1		0.250	0.2531	0.1051	0.1057	0.0110	0.951	0.669
X3	ON						
X1		0.250	0.2532	0.1078	0.1061	0.0116	0.946	0.659
X2	WITH						
X3		0.100	0.1013	0.0901	0.0850	0.0081	0.950	0.227
Y1	WITH						
Y2		0.200	0.0953	0.0323	0.0298	0.0120	0.135	0.950
Means								
X1		0.000	0.0039	0.1292	0.1274	0.0167	0.933	0.067
Intercepts								
X2		0.000	0.0008	0.1058	0.1043	0.0112	0.948	0.052
X3		0.000	0.0005	0.1034	0.1048	0.0107	0.946	0.054
Y1		0.000	-0.0013	0.0619	0.0605	0.0038	0.938	0.062
Y2		0.000	-0.0029	0.0630	0.0605	0.0040	0.945	0.055
Variances								
X1		1.000	0.9814	0.1760	0.1792	0.0313	0.922	1.000
Residual Variances								
X2		0.675	0.6479	0.1247	0.1183	0.0163	0.890	1.000
X3		0.675	0.6532	0.1235	0.1193	0.0157	0.902	1.000
Y1		0.225	0.2105	0.0410	0.0384	0.0019	0.866	1.000
Y2		0.225	0.2105	0.0392	0.0384	0.0017	0.889	1.000

$N = 75$

Y1	ON						
X1		0.250	0.2497	0.0614	0.0591	0.0038	0.944	0.983
X2		0.250	0.2473	0.0716	0.0677	0.0051	0.926	0.929
X3		0.100	0.1001	0.0665	0.0676	0.0044	0.958	0.329

Y2	ON						
X1		0.250	0.2513	0.0610	0.0591	0.0037	0.947 0.987
X3		0.250	0.2503	0.0692	0.0676	0.0048	0.937 0.950
X2		0.100	0.0986	0.0698	0.0677	0.0049	0.945 0.320
X2	ON						
X1		0.250	0.2516	0.0962	0.0946	0.0093	0.949 0.751
X3	ON						
X1		0.250	0.2527	0.0980	0.0946	0.0096	0.948 0.745
X2	WITH						
X3		0.100	0.1022	0.0777	0.0764	0.0060	0.947 0.249
Y1	WITH						
Y2		0.200	0.0954	0.0280	0.0269	0.0117	0.081 0.984
Means							
X1		0.000	0.0008	0.1128	0.1143	0.0127	0.951 0.049
Intercepts							
X2		0.000	0.0005	0.0914	0.0936	0.0083	0.951 0.049
X3		0.000	-0.0027	0.0943	0.0937	0.0089	0.946 0.054
Y1		0.000	0.0002	0.0558	0.0541	0.0031	0.940 0.060
Y2		0.000	-0.0001	0.0564	0.0541	0.0032	0.948 0.052
Variances							
X1		1.000	0.9859	0.1577	0.1610	0.0251	0.922 1.000
Residual Variances							
X2		0.675	0.6538	0.1132	0.1068	0.0132	0.891 1.000
X3		0.675	0.6538	0.1081	0.1068	0.0121	0.911 1.000
Y1		0.225	0.2127	0.0363	0.0347	0.0015	0.884 1.000
Y2		0.225	0.2124	0.0352	0.0347	0.0014	0.890 1.000

Table 14 *Mean and Standard Deviations for Measures*

Scale	Mean	SD	Minimum	Maximum
CBQ-T: Attentional Focusing	4.90	1.18	2.00	6.83
CBQ-T: Inhibitory Control	4.85	1.25	1.33	6.83
NEPSY: Auditory Attention	9.97	3.35	4	18
NEPSY: Design Fluency	7.95	3.19	2	14
NEPSY: Statue	10.60	2.99	3	14
NEPSY: Tower	11.23	2.76	3	16
TAT: Level of Abstraction	2.55	.64	1.00	4.00
TAT: Level of Perceptual Integration	2.45	.63	1.33	3.83
TAT: Level of Cognitive Experiential Integration	2.34	.63	1.17	3.67
TAT: Level of Associative Thinking	2.39	.55	1.17	4.0
TAT: Level of Self-Regulation	2.30	.70	1.17	4.50
BRIEF: BRI scale	54.84	15.89	42	116
SSIS: Social Skills Scale	101.19	13.62	73	130

Note. SD = Standard Deviation

Table 15 *Pearson's Correlation between the SSIS Social Skills Subscales (Partial Correlations Controlling for Vocabulary)*

	Commun-ication	Coop-eration	Assertion	Responsibility	Empathy	Engagement	Self-Control
Communication	1	.83** (.82**)	.47** (.41**)	.87** (.85**)	.64** (.61**)	.65** (.62**)	.78** (.77*)
Cooperation		1	.38** (.30*)	.80** (.78**)	.56** (.52**)	.52** (.48**)	.77** (.75**)
Assertion			1	.54** (.47**)	.62** (.59**)	.64** (.61**)	.46** (.42**)
Responsibility				1	.65** (.62**)	.54** (.50**)	.81** (.80**)
Empathy					1	.64** (.61**)	.63** (.61**)
Engagement						1	.48** (.45**)
Self-Control							1

Note. * $p \leq .05$; ** $p \leq .01$

Table 16 *Correlations between Age, Gender, and Measures*

Measure	Age in Months	Gender
WPPSI: Vocabulary	.04	.05
Auditory Attention	-.16	-.06
Design Fluency	.22	.13
Statue	.14	.27*
Tower	.25*	.10
BRIEF BRI	.19	.05
SSIS	.19	.25*
Level of Abstraction	.35** (N = 61)	.04 (N = 61)
Level of Perceptual Integration	.45** (N = 61)	.01 (N = 61)
Level of Cognitive Experiential Integration	.40** (N = 61)	.03 (N = 61)
Level of Associative Thinking	.27* (N = 61)	.12 (N = 61)
Level of Self-Regulation	.39** (N = 61)	.12 (N = 61)
Attentional Focusing	-.07	-.04
Inhibitory Control	-.06	.07

Note. N = 62, unless otherwise noted. Age calculated in months. * $p \leq .05$; ** $p \leq .01$.

Table 17 *Pearson's Correlation between WPPSI: Vocabulary and the CBQ-T, NEPSY, TAT, BRI, and SSIS scales*

Measure	WPPSI-III: Vocabulary
CBQ-T: Attentional Focusing	.20
CBQ-T: Inhibitory Control	.22
NEPSY: Auditory Attention	.31*
NEPSY: Design Fluency	.27*
NEPSY: Statue	.11
NEPSY: Tower	.11
TAT: Abstraction	.39**
TAT: Perceptual Integration	.37**
TAT: Cognitive Experiential Integration	.37**
TAT: Self-Regulation	.30*
BRI	-.15
SSIS Social Skills Scale	.34**

Note. * $p \leq .05$; ** $p \leq .01$

Table 18 *Correlations between CBQ-T Effortful Control Scales and Measures of Executive Functioning and Social Competence (Partial Correlations Controlling for WPPSI-IV: Vocabulary)*

Measure	CBQ-T: Attentional Focusing	CBQ-T: Inhibitory Control
Auditory Attention	.38** (.34**)	.43** (.39**)
Design Fluency	.35**(.31*)	.29* (.24)
Statue	.26* (.24)	.25 (.23)
Tower	.17 (.16)	.22 (.21)
Level of Abstraction	.24 (.18)	.18 (.10)
Level of Perceptual Integration	.22 (.16)	.27* (.20)
Level of Cognitive Experiential Integration	.29* (.24)	.30* (.24)
Level of Associative Thinking	.23 (.19)	.25 (.20)
Level of Self-Regulation	.17 (.12)	.19 (.14)
BRIEF BRI	-.45** (-.44**)	-.40** (-.38**)
SSIS Social Skills Index	.44** (.41**)	.52** (.49**)

Note. * $p \leq .05$; ** $p \leq .01$

Table 19 *Correlations between NEPSY EF Tasks and TAT EF Levels (Partial Correlations Controlling for WPPSI-IV: Vocabulary)*

	Auditory Attention	Design Fluency	Statue	Tower
Level of Abstraction	.18 (.07)	.26* (.17)	.23 (.21)	.27* (.25)
Level of Perceptual Integration	.24 (.14)	.33** (.26*)	.28* (.26)	.33** (.31*)
Level of Cognitive Experiential Integration	.28* (.18)	.32* (.25)	.27* (.25)	.25* (.23)
Level of Associative Thinking	.35** (.28*)	.29* (.23)	.28* (.26*)	.20 (.18)
Level of Self-Regulation	.18 (.10)	.33** (.27*)	.27* (.25)	.11 (.08)

Note. * $p \leq .05$; ** $p \leq .01$

Table 20 *Correlations between the EF tasks and the Measures of Social Competence (Partial Correlations Controlling for Vocabulary)*

Effortful Control Scale	BRIEF BRI	SSIS Social Skills Index
Auditory Attention	-.25* (-.22)	.26* (.17)
Design Fluency	-.23 (-.20)	.33** (.26*)
Statue	-.12 (-.10)	.13 (.10)
Tower	-.18 (-.16)	.15 (.12)
Level of Abstraction	-.11 (-.06)	.36** (.27*)
Level of Perceptual Integration	-.08 (-.04)	.37** (.28*)
Level of Cognitive Experiential Integration	-.14 (-.10)	.39** (.31*)
Level of Associative Thinking	-.12 (-.08)	.39** (.32**)
Level of Self-Regulation	-.09 (-.05)	.37** (.30*)
BRI	1	-.49**

Note. * $p \leq .05$; ** $p \leq .01$

Table 21 *Pearson's Correlations and the Covariances between the Composite Variables*

	CBQ-T: Effortful Control	NEPSY EF	TAT EF	BRI Social Competence	SSIS Social Competence	WPPSI: Vocabulary
CBQ-T: Effortful Control	1	.48** (1.10)	.26* (.17)	-.45** (-8.04)	.51** (7.86)	.22 (.64)
NEPSY EF		1 (3.99)	.42** (.49)	-.30* (-9.46)	.34** (9.05)	.31* (1.55)
TAT EF			1 (.34)	-.12 (-.97)	.40** (3.09)	.36** (.53)
BRI Social Competence				1 (248.43)	-.50** (-106.99)	-.15 (-5.92)
SSIS Social Competence					1 (182.48)	.34** (11.35)
WPPSI: Vocabulary						1 (6.27)

Note. Covarancies reported in the parentheses. * $p \leq .05$; ** $p \leq .01$

Table 22 *Model 1a Path Analysis Parameter Estimates, their Standard Errors, and p-values*

	Model 1a							
Parameter	Unstandardized				Standardized			
	Value	SE	*t*	*p*	Value	SE	*t*	*p*
BRI-CBQT	-5.40	2.01	-2.68	.01	-.39	.12	-3.39	.00
BRI-WPPSI	-0.18	.96	-.19	.85	-.03	.15	-.19	.85
BRI-NEPSY	-0.86	1.74	-.50	.62	-.11	.22	-.49	.62
NEPSY-CBQT	.76	.16	4.89	.00	.44	.09	4.61	.00
NEPSY-WPPSI	.17	.10	1.68	.09	.21	.11	1.90	.06
SSIS-CBQT	4.91	1.67	2.94	.00	.41	.15	2.84	.00
SSIS-WPPSI	.83	.64	1.30	.19	.15	.11	1.41	.16
SSIS-TAT	5.63	2.59	2.17	.03	.24	.10	2.56	.01
TAT-CBQT	.10	.08	1.22	.22	.19	.15	1.24	.22
TAT-WPPSI	.08	.02	3.86	.00	.32	.09	3.73	.00

Table 23 *Model 1b Path Analysis Parameter Estimates, their Standard Errors, and p-values*

	Model 1b							
Parameter	Unstandardized				Standardized			
	Value	SE	*t*	*p*	Value	SE	*t*	*p*
BRI-CBQT	-6.41	1.52	-4.21	.00	-.46	.09	-5.22	.00
BRI-WPPSI	-0.60	.82	-.73	.47	-.09	.13	-.73	.47
BRI-TAT	3.64	1.50	2.42	.02	.13	.06	2.33	.02
NEPSY-CBQT	.76	.16	4.89	.00	.44	.09	4.61	.00
NEPSY-WPPSI	.17	.10	1.68	.09	.21	.11	1.90	.05
SSIS-CBQT	5.43	2.12	2.56	.01	.46	.18	2.55	.01
SSIS-WPPSI	1.25	.88	1.41	.16	.23	.14	1.64	.10
SSIS-NEPSY	.04	1.06	.04	.97	.01	.16	.04	.97
TAT-CBQT	.10	.08	1.22	.22	.19	.15	1.24	.22
TAT-WPPSI	.07	.02	3.59	.00	.32	.09	3.47	.01

Table 24 *Model 2a Path Analysis Parameter Estimates, their Standard Errors, and p-values*

	Model 2a							
Parameter	Unstandardized				Standardized			
	Value	SE	*t*	*p*	Value	SE	*t*	*p*
BRI-NEPSY	-1.62	1.42	-1.15	.25	-.21	.19	-1.12	.26
BRI-WPPSI	-.54	.97	-.56	.58	-.09	.16	-.56	.57
NEPSY-WPPSI	.25	.10	2.43	.02	.31	.12	2.65	.01
SSIS-TAT	7.27	1.78	4.08	.00	.32	.06	5.94	.00
SSIS-WPPSI	1.19	.61	1.97	.05	.22	.10	2.25	.03
TAT-WPPSI	.09	.01	5.90	.00	3.63	.08	4.65	.00

Table 25 *Model 2b Path Analysis Parameter Estimates, their Standard Errors, and p-values*

	Model 2b							
Parameter	Unstandardized				Standardized			
	Value	SE	*t*	*p*	Value	SE	*t*	*p*
BRI-TAT	2.10	3.36	.62	.53	.08	.13	.62	.54
BRI-WPPSI	-1.12	.83	-1.35	.17	-.18	.13	-1.32	.18
NEPSY-WPPSI	.25	.10	2.43	.02	.31	.12	2.65	.01
SSIS-NEPSY	.81	1.04	.77	.44	.12	.16	.76	.45
SSIS-WPPSI	1.61	.94	1.71	.09	.30	.16	1.95	.05
TAT-WPPSI	.09	.01	6.31	.00	.36	.08	4.89	.00

Figure 1.1. Model 1a: Path model examining the direct and indirect relations between the CBQ-T and measures of EF and social competence and the direct relations between measures of EF and social competence along matched performance conditions.

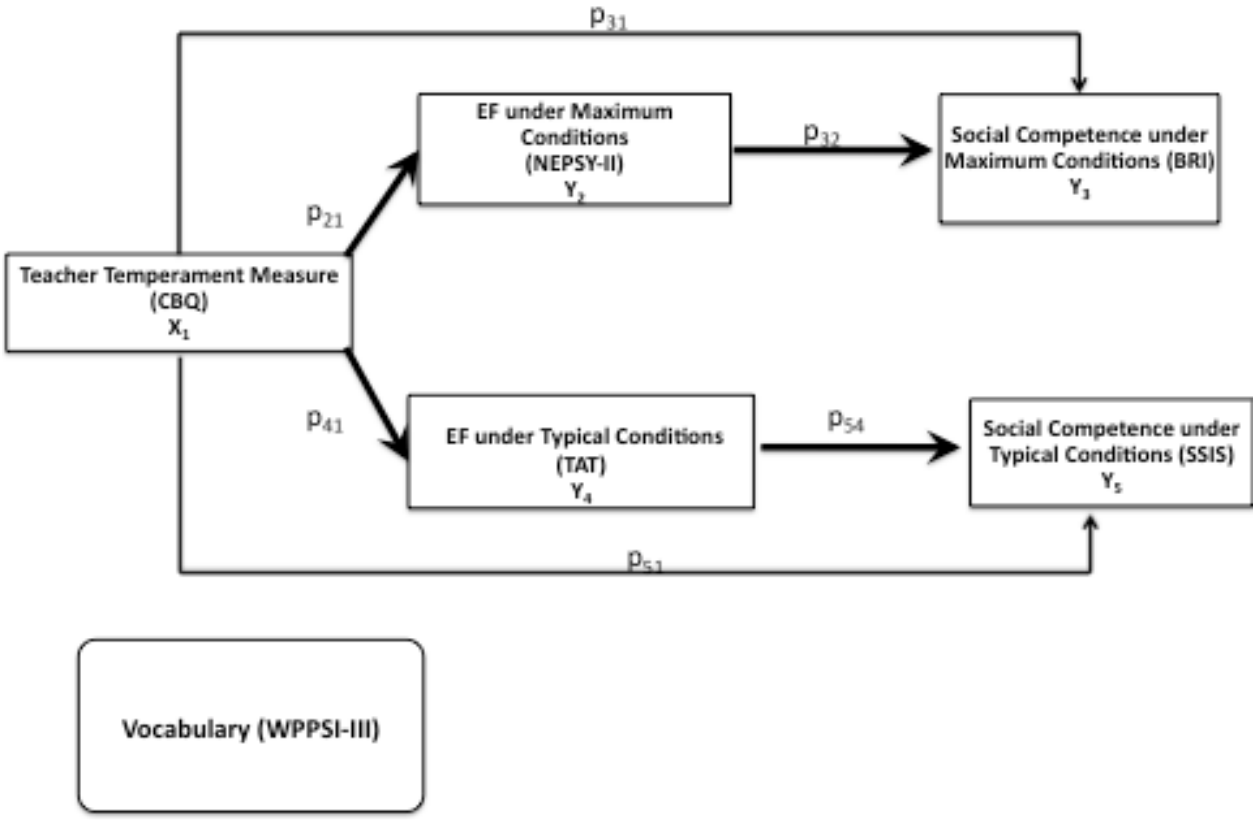

Figure 1.2. Model 1b: Path model examining the direct and indirect relations between the CBQ-T and measures of EF and social competence and the direct relations between measures of EF and social competence along non-matched performance conditions.

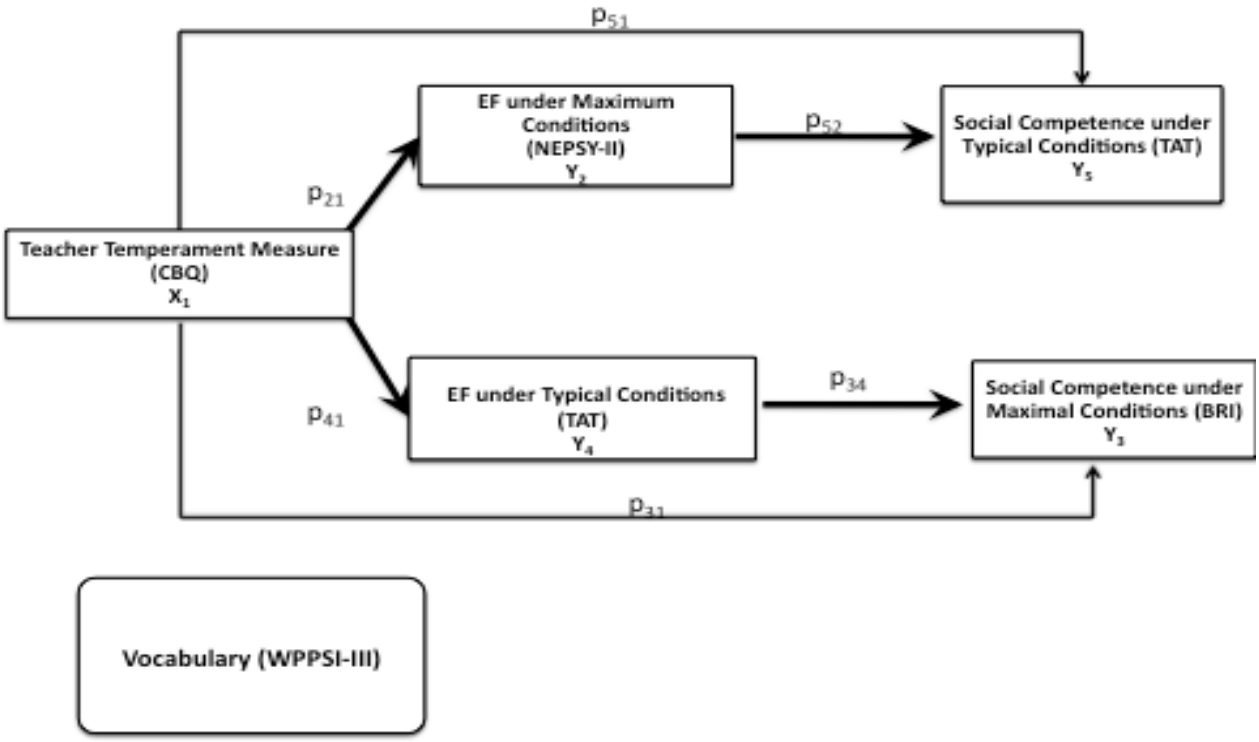

Figure 2.1. Model 2a: Path model examining the direct relations between measures of EF and social competence along matched performance conditions.

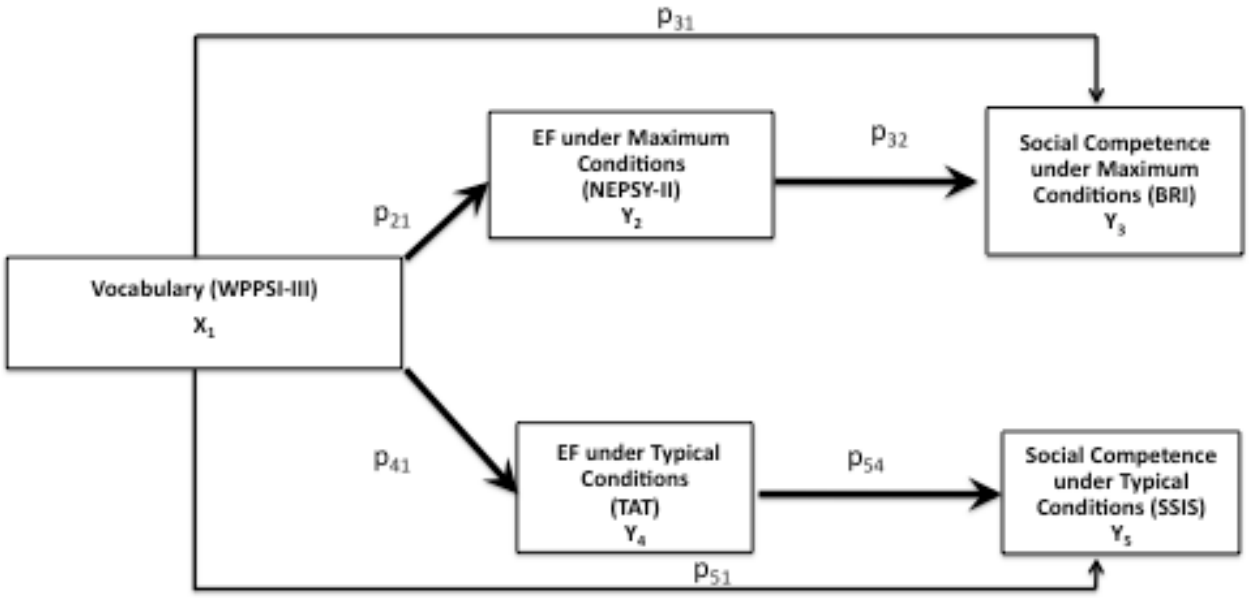

Figure 2.2. Model 2b: Path model examining the direct relations between measures of EF and social competence along non-matched performance conditions.

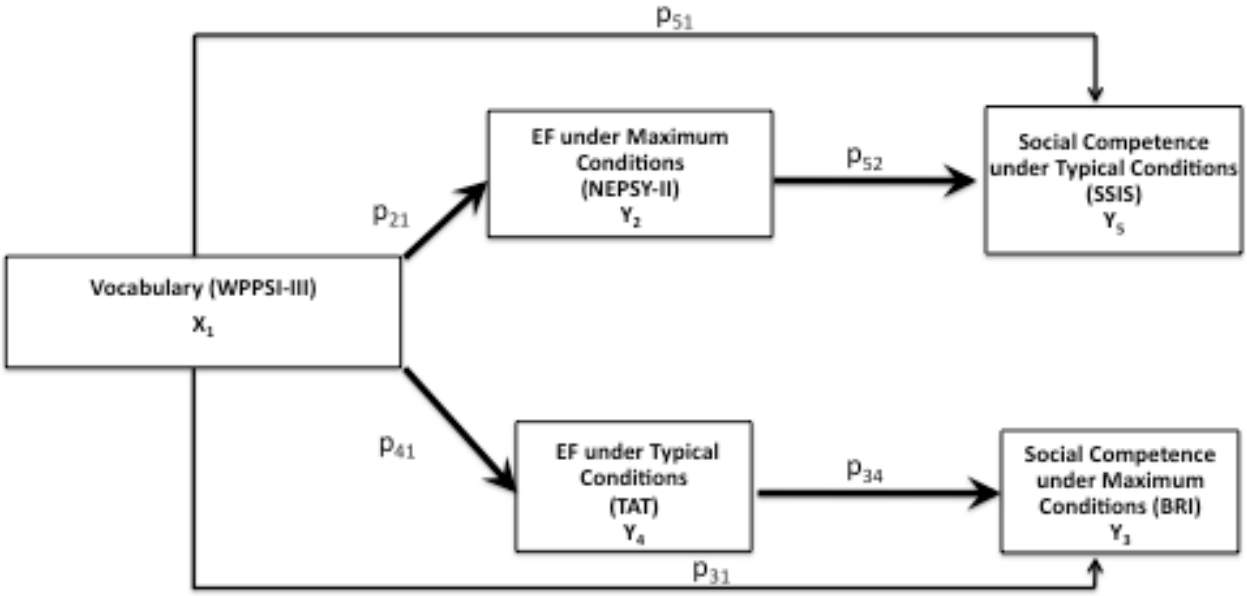

Figure 3. Horn's parallel analysis of the TAT subtasks.

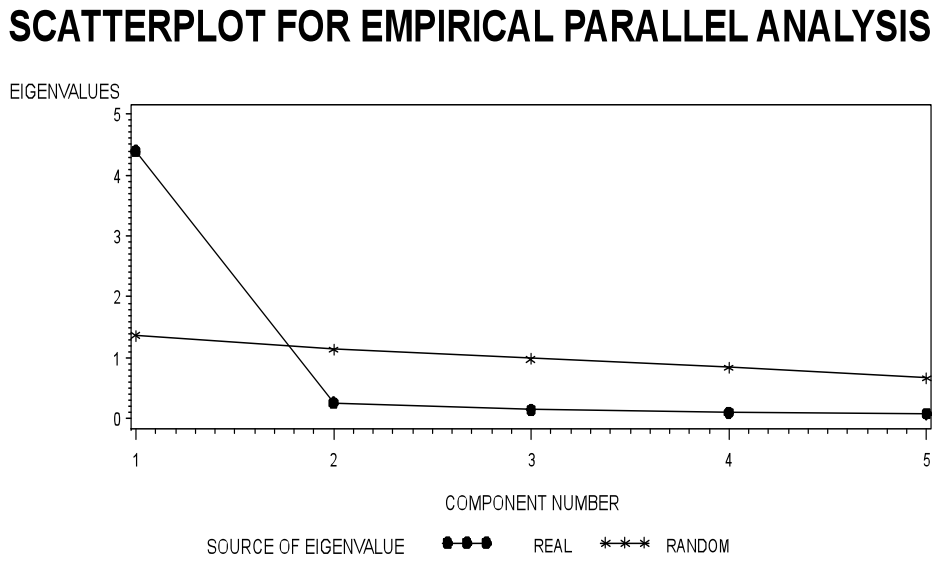

Figure 4. Horn's parallel analysis of the NEPSY scales.

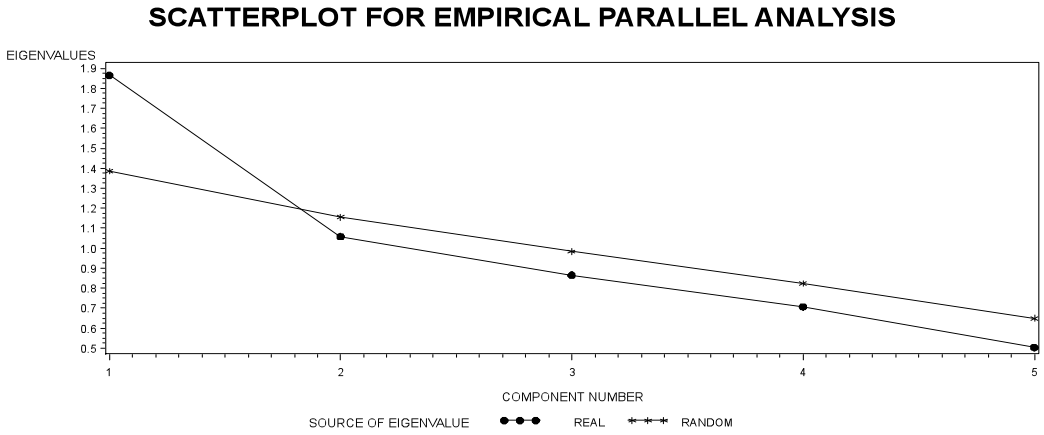

Figure 5.1. Model 1a: Results of Path Analysis Examining the Relations between Self-Regulatory Abilities and the relation among Performance Measures Across Matched Performance Conditions.

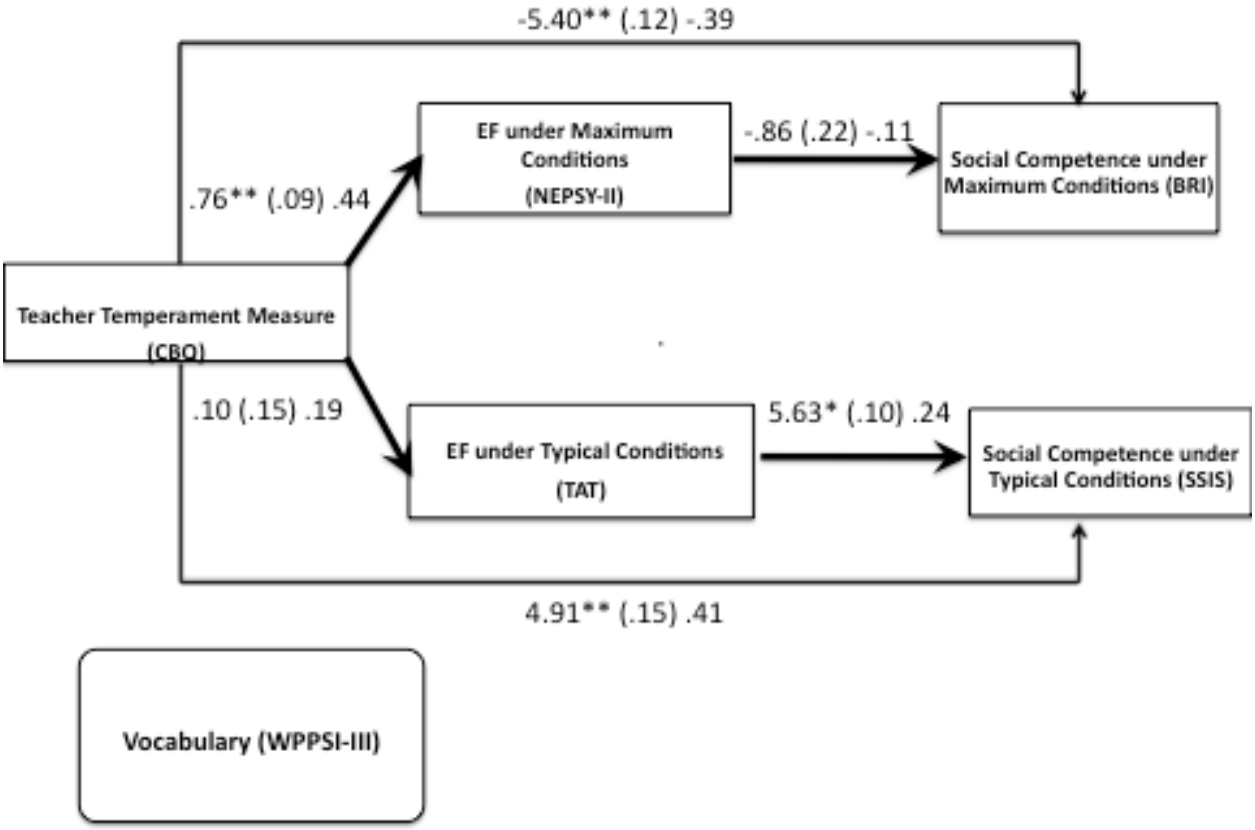

Figure 5.1. An observed variable path analysis examining the model fit between the CBQ-T and measures of EF and social competence along matched performance conditions while controlling for vocabulary. Estimates are reported as unstandardized (standard error) standardized. * indicates statistically significant results at the .05 level, and ** at the .01 level.

Figure 5.2. Model 1b: Results of Path Analysis Examining the Relations between Self-Regulatory Abilities and the relation among Performance Measures Across Non-Matched Performance Conditions.

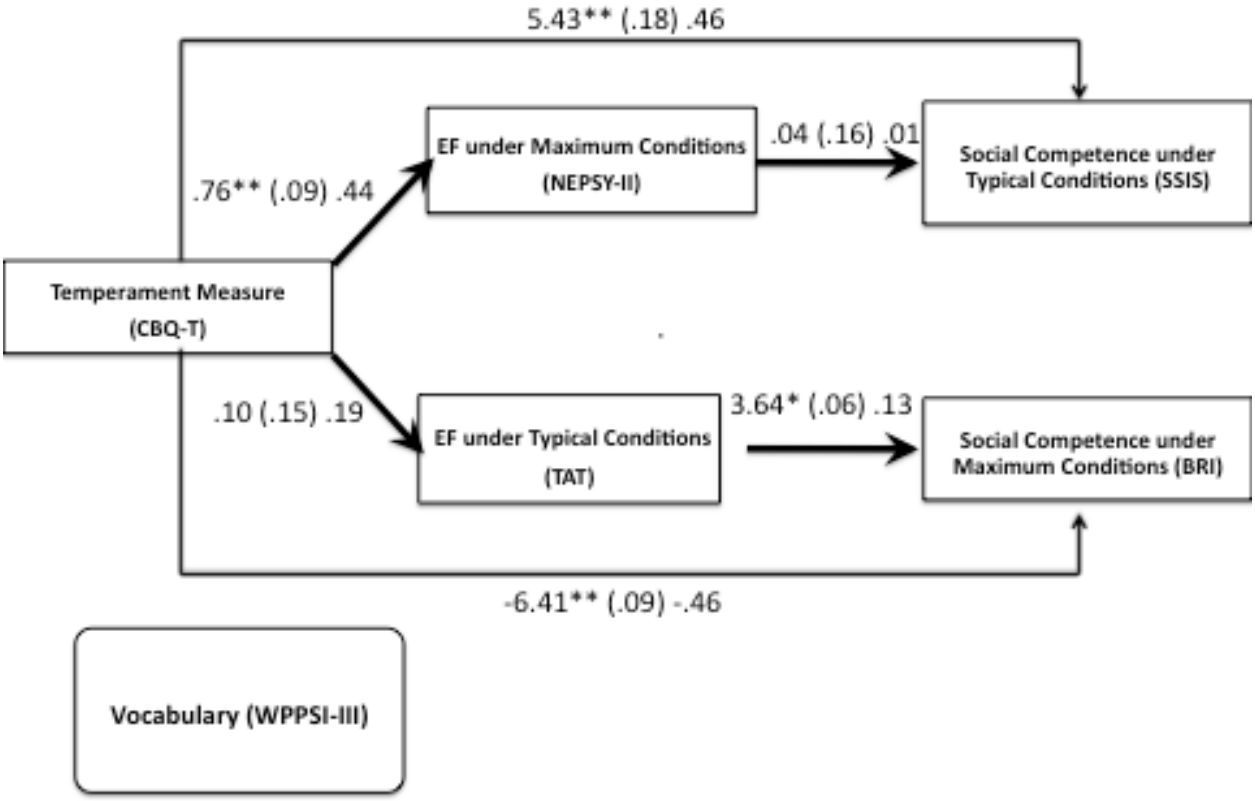

Figure 5.2. An observed variable path analysis examining the model fit between the CBQ-T and measures of EF and social competence along non-matched performance conditions while controlling for vocabulary. Estimates are reported as unstandardized (standard error) standardized. * indicates statistically significant results at the .05 level, and ** at the .01 level.

Figure 6.1. Model 2a: Results of Path Analysis Examining Performance Measures of EF and Social Competence Across Matched Performance Conditions.

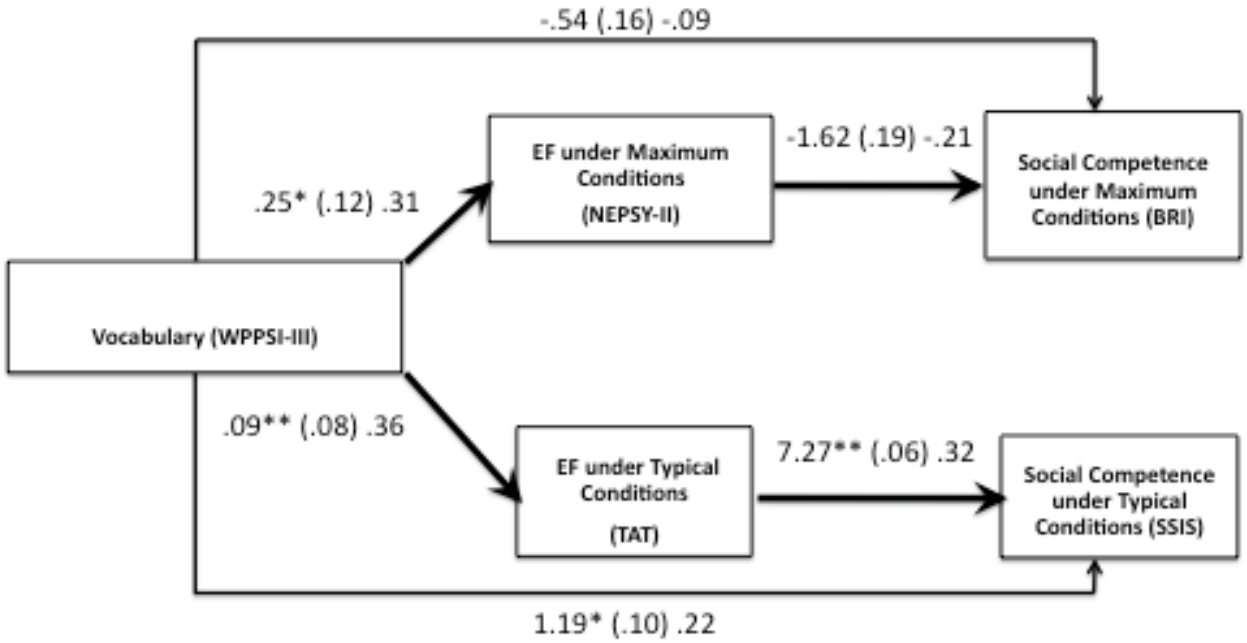

Figure 6.1. An observed variable path analysis examining the model fit between measures of Executive Functioning and social competence along matched performance conditions. Estimates are reported as unstandardized (standard error) standardized. * indicates statistically significant results at the .05 level, and ** at the .01 level.

Figure 6.2. Model 2b: Results of Path Analysis Examining Performance Measures of EF and Social Competence Across Non-Matched Performance Conditions.

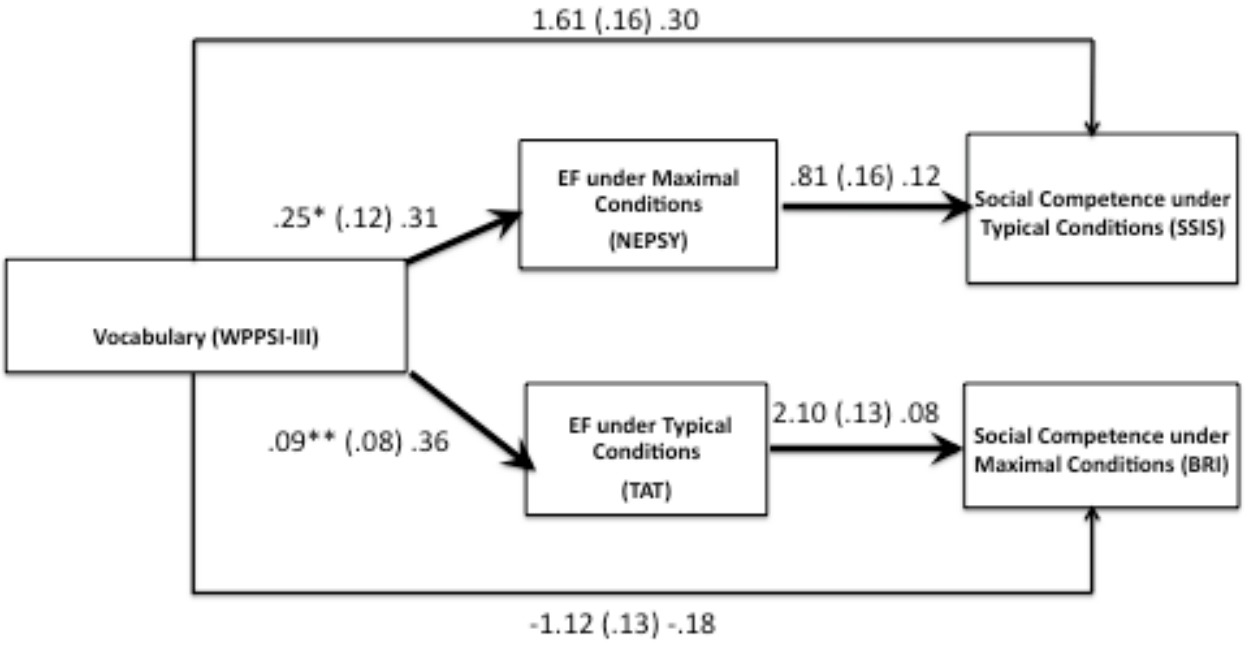

Figure 6.2. An observed variable path analysis examining the model fit between measures of Executive Functioning and social competence along non-matched performance conditions. Estimates are reported as unstandardized (standard error) standardized. * indicates statistically significant results at the .05 level, and ** at the .01 level.

References

Ahadi, S.A. & Rothbart, M.K. (1994). Temperament, development, and the big five. In C.F. Halverson, Jr., G.A. Kohnstamm & R.P. Martis (Eds.), *The developing structure of temperament and personality from infancy to adulthood*, Hillsdale, NJ: Erlbaum.

Anderson, V. (1989). Assessing executive functions in children: Biological, psychological, and developmental considerations. *Neuropsychological Rehabilitation, 8,* 319–349.

Anderson, S. & Messick, S. (1974). Social Competency in Young Children. *Developmental Psychology, 10,* 282-293.

Bakan, D. (1996). *The duality of human existence.* Chicago: Rand McNally.

Barkley, R. A. (2001). The executive functions and self-regulation: An evolutionary neuropsychological perspective. *Neuropsychology Review, 11,* 1-29.

Baron, I. S. (2004). Neuropsychological evaluation of the child. New York, NY: Oxford University Press.

Bierman, K. L. & Welsh, J. A. (1997). Social relationship deficits. In E. J. Mash & L. G. Terdal (Eds.), Assessment of childhood disorders (pp. 328-365). New York: Guilford Press.

Blair, C. (2002). School readiness: Integrating cognition and emotion in a neurobiological conceptualization of child functioning at school entry. *American Psychologist, 57,* 111 – 127.

Blair, K.A., Denham, S.A., Kochanoff, A., & Whipple, B. (2004). Playing it cool: Temperament, emotion regulation, and social behavior in preschoolers. *Journal of School Psychology*, *42*, 419-443.

Blair, C. & Razza, R.P. (2007). Relating effortful control, executive function, and false belief understanding to emerging math and literacy ability in Kindergarten. *Child Development, 78,* 647-663.

Blair, C., & Ursache, A. (2011). A bidirectional model of executive functions and self-regulation. In R. F. Baumeister & K. D. Vohs (Eds.), *Handbook of self-regulation* (2nd ed., pp. 300 –320). New York, NY: Guilford Press.

Blankman, C., Teglasi, H., & Lawser, M. (2002). Thematic apperception, narrative schemas, and literacy. *Journal of Psychoeducational Assessment*, *20*, 268-289.

Bjork, R.A., Bjork, E.L., & Anderson, M.C. (1998). Varieties of goal-directed forgetting. In J.M. Golding and C.M. MacLeod, (Eds.), *Intentional forgetting: Interdisciplinary approaches* (pp.103-138). N.J.: Lawrence.

Bohlin, G., Hagekull, B. & Anderson, K. (2005). Behavioral inhibition as a precursor of peer social competence in early school age: The interplay with attachment and nonparental care. *Merrill-Palmer Quarterly, 51*, 1-19.

Bridgett, D.J., Oddi, K.B., Laake, L.M., Murdock, K.W., & Bachmann, M.N. (2013). Integrating and differentiating aspects of self-regulation: Effortful control, executive functioning, and links to negative affectivity. *Emotion, 13*, 47-63.

Browne, M. W., & Cudeck, R. (1992). Alternative ways of assessing model fit. *Sociological Methods and Research, 21*, 230-258.

Byrne, B.M. (1998). Structural Equation Modeling with LISREL, PRELIS and SIMPLIS: Basic Concepts, Applications and Programming. Mahwah, New Jersey: Lawrence Erlbaum Associates.

Carlson, S.M., Moses, L.J., & Breton, C. (2002). How specific is the relation between executive function and theory of mind? Contributions of inhibitory control and working memory. *Infant and Child Development, 11,* 73-92

Carlton, M.P., & Winsler, A. (1999). School readiness: The need for a paradigm shift. *School* Psychology Review, 28, 338-352.

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). New Jersey: Lawrence Erlbaum.

Cole, P. M., Usher, B. A., & Cargo, A. P. (1993). Cognitive risk and its association with risk for disruptive behavior disorders in preschoolers. Journal of Clinical Child Psychology, 22, 154–164.

Cortina, J.M. (1993). What is coefficient alpha? An examination of theory and applications. Journal of Applied Psychology, 78, 98-104.

Crawford, J.S., Espy, K.A., Gioia, G.A., Isquith, P.K. (2005), Assessment of Executive Function in Preschool-aged Children, *Mental Retardation and Developmental Disabilities Research Reviews*, *11*, 209-215.

Cronbach, L.J. (1960). Essentials of Psychological Testing (2nd Edition). New York: Harper.

Denham, S. A. (2006). Social-emotional competence as support for school readiness: What is it and how do we assess it? Early Education and Development, 17, 57-89.

Denckla, M.B. (1996). A theory and model of executive function: A neuropsychological perspective. In G.R. Lyon and N.A. Krasnegor, (Eds.), *Attention, memory, and executive function* (pp.263-278). Baltimore: Brooks.

Derryberry, D., & Rothbart, M. K. (1997). Reactive and effortful processes in the organization of temperament. Development and Psychopathology, 9, 633-652.

Dodge, K.A., Pettit, G.S., McClaskey, C.L., & Brown, M.M. (1986). Social competence in children. *Monographs of the Society for Research in Child Development, 51,* Serial No. 213.

DuBois, C. L. Z., Sackett, P. R., Zedeck, S., and Fogli, L. (1993). Further exploration of typical and maximal performance criteria: Definitional issues, prediction, and White-Black differences. *Journal of Applied Psychology, 78,* 205-211.

Eriksen, B.A. & Eriksen, C.W. (1974). Effects of noise letters upon the identification of a target letter in a non-search task, *Perception Psychophysics*, *16,* 143–149.

Ewart, C.K, Jorgensen, R.S., Suchday, S., Chen, E., & Matthews, K.A. (2002). Measuring stress resilience and coping in vulnerable youth: The social competence interview. *Psychological Assessment, 14,* 339-352.

Foulks, B., & Morrow, R.D. (1989). Academic survival skills for the young child at- risk of school failure. Journal of Educational Research, 82, 4.

Ford, M.E. (1982). Social cognition and social competence in adolescence. *Developmental Psychology, 18,* 323-340.

Ganesalingam, K., Yeates, K.O., Taylor, H.G., Walz, N.C., Stancin, T., Wade, S. (2011). Executive functions and social competence in young children 6 months following traumatic brain injury. *Neuropsychology, 25,* 466-476.

Gioia, G.A. & Isquith, P.K. (2004). Ecological assessment of executive function in traumatic brain injury. Developmental Neuropsychology, 25, 135-158.

Gioia, G.A., Isquith, P.K., Guy, S.C, & Kenworthy, L. (2000). Test review: The Behavior Rating Inventory of Executive Functioning. *Child Neuropsychology, 6,* 235-238.

Green, S.B. & Yang, Y. (2009). Reliability of summed item scores using structural equation

modeling: An alternative to coefficient alpha. *Psychometrika, 74*, 155-167.

Gresham, F. M. & Elliott, S. N. (2008). SSIS Social Skills Improvement System: Rating Scales Manual. Minneapolis: Pearson.

Gresham, F. M., Elliott, S. N., Vance, M. J., & Cook, C. R. (2011). Comparability of the Social Skills Rating System to the Social Skills Improvement System: Content and psychometric comparisons across elementary and secondary age levels. School Psychology Quarterly, 26(1), 27-44.

Hughes, C. & Graham, A. (2002). Measuring executive functions in childhood: Problems and solutions. *Child and Adolescent Mental Health*, *7*, 131-142.

Jahromi, L.B. & Stifter, C.A. (2008). Individual differences in preschoolers' self-regulation and theory of mind. *Merrill-Palmer Quarterly, 54,* 125-150.

Kagan, J. (1986). Rates of change in psychological processes. *Journal of applied developmental psychology, 7*, 125-130.

Kopp, C. (1989). Regulation of distress and negative emotions: A developmental view. *Developmental Psychology, 25*, 343 – 354.

Korkman, M., Kirk, U., & Kemp, S. (2006). NEPSY: A Developmental Neuropsychological Assessment. San Antonio, TX: Psychological Corporation.

Korkman, M., Kirk, U., & Kemp, S. (2007). NEPSY- II: A Neuropsychological Assessment-Second Edition. San Antonio, TX: Psychological Corporation.

Kochanska, G. (1993), Toward a synthesis of parental socialization and child temperament in early development of conscience. Child Development, 64, 325–347.Kochanska G,

Murray, K.T. & Harlan, E.T. (2000) Effortful control in early childhood: Continuity and change,

antecedents, and implications for social development. *Developmental Psychology, 36,* 220–232.

Ladd, G.W., Hearld, S.L., & Kochel, K.P. (2006). School readiness: Are there social prerequisites? *Early Education and Development, 17,* 115-150.

Lalonde, C.E. & Chandler, M.J. (1995). False belief understanding in school. On the social-emotional consequence of coming early or late to a first theory of mind. Cognition and Emotion, 2, 167 – 185.

Levin, H.S. & Hanten, G. (2005). Executive functions after traumatic brain injury in children. *Pediatric Neurology, 33,* 79-93.

Lezak, M. D. (2004). Neuropsychological assessment (4th Ed.). New York: Oxford University Press.

Logan, G.D. (1994). On the ability to inhibit thought and action: A users' guide to the Stop Signal Paradigm. In: D. Dagenbach and T.H. Carr (Eds). Inhibitory *processes in attention, memory, and language*, San Diego: Academic, 189–239.

Lohr, L.B., Teglasi, H., & French, M. (2004). Schemas and temperament as risk factors for emotional disability. *Personality and Individual Differences, 36,* 1637- 1654.

Lundy, A. (1985). The reliability of the Thematic Apperception Test. *Journal of Personality Assessment*, *49*, 141-149.

MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods, 1*, 130-149. doi: 10.1037/1082-989X.1.2.130

Miyake, A., Friedman, N. P., Emerson, M. J., Witzki, A. H., Howerter, A., & Wager, T. D. (2000). The unity and diversity of executive functions and their contributions to complex ‘‘frontal lobe’’ tasks: A latent variable analysis. *Cognitive Psychology, 41*, 49–100.

Morgan, A.B., & Lilienfeld, S.O. (2000). A meta-analytic review of the relation between antisocial behavior and neuropsychological measures of executive function. *Clinical Psychology Review, 20,* 113-136.

Muthén, L., & Muthén, B. (2002). How to use a Monte Carlo study to decide on sample size and determine power. Structural Equation Modeling, 4, 599–620.

Nienow, T.M., Docherty, N.M., Cohen, A.S., & Dinzeo, T.J. (2006). Attentional dysfunction, social perception, and social competence: What is the nature of the relationship? *Journal of Abnormal Psychology, 3,* 408-417.

Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). New York: McGraw-Hill.

Osborne, J. W. (2000). Advantages of hierarchical linear modeling. *Practical Assessment,* Research & Evaluation, 7(1).

Pennington, B. F., Bennetto, L, McAleer, O. K. & Roberts, R. J., Jr. (1996). Executive functions and working memory: Theoretical and measurement issues. In G. R.Lyon & N. A.Krasnegor (Eds.), Attention, Memory and Executive Function (pp. 327–348). Baltimore: Brookes Publishing Company.

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

Posner, M.I. & Rothbart, M.K. (2007). Research on attention networks as a model for the integration of psychological science. *Annual Review of Psychology*, *58*, 1-23.

Putnam, S.P. and Rothbart, M.K. (2000). Children’s behavior questionnaire.

http://www.bowdoin.edu/~sputnam/rothbart-temperament-questionnaires/instrument-descriptions/childrens-behavior-questionnaire.html

Raver, C.C. (2002). Emotions matter: Making the case for the role of young children's emotional development for early school readiness. *Social Policy Report: Giving Child and Youth Development Knowledge Away, 16,* 3-18.

Raver, C.C. & Zigler, E.F. (1997). Social competence: An untapped dimension in evaluating Head Start's success. *Early Childhood Research Quarterly, 12,* 363-385.

Reed MA. & Derryberry, D. (1995). Temperament and attention to positive and negative trait information. *Personality and Individual Differences, 18,* 135–147.

Rhode Island KIDS COUNT. (2005). Getting Ready: Findings from the National School Readiness Indicators Initiative A 17 State Partnership. http://www.gettingready.org/matriarch/d.asp?PageID=303&PageName2=pdfhold&p=&PageName=Getting+Ready+%2D+Full+Report%2Epdf

Rose-Krasnor, L. (1997). The nature of social competence: A theoretical review. *Social Development, 6,* 111-134.

Rothbart, M. K. (1989). Temperament and development. In G. A. Kohnstamm, J. E. Bates, & M. K. Rothbart (Eds.), *Temperament in childhood* (pp. 187–248). New York: Wiley.

Rothbart, M. (2004). Commentary: Differentiated Measures of Temperament and multiple pathways to childhood disorders. *Journal of Clinical Child and Adolescent Psychology, 33*, 82-87.

Rothbart, M.K., Ahadi, S.A., Hershey, K.L., & Fisher, P. (2001). Investigations of temperament at three to seven years: The Children's Behavior Questionnaire. *Child Development, 72,* 1394-1408.

Rothbart, M. & Bates, J. (1998). Temperament. In N. Eisenberg (Ed.),. In W. Damon (Ed.), *Handbook of child development, 3. Social, emotional, and personality development*, 105-176.

Rothbart, M., & Bates, J. (2006). Temperament. In N. Eisenberg, W. Damon, & L. M. Richard (Eds.), Handbook of child psychology: Vol. 3, Social, emotional, and personality *development (6th ed.)* (pp. 99-166). Hoboken, NJ US: John Wiley & Sons Inc.

Rothbart, M. K., Ellis, L.K., Rueda, M.R., & Posner, M.I. (2003). Developing mechanisms of temperamental effortful control. *Journal of Personality, 71*, 1113-1144.

Rubin, K.H. & Rose-Krasnor, L. (1992). Interpersonal problem solving. In V.B. Van Hasselt & M. Hersen (Eds.), Handbook of Social Development (pp. 283-323)

Rubin, K.H. & Ross, H.S. (1988). Toward the study of social competence, social status and social relationships: A commentary. *Monographs of The Society for Research in Child Development*, *53*, 79-87.

Sackett, P.R, Zedek, S. & Fogli, L. (1988). Relations between measures of job performance. Journal of Applied Psychology, 73, 482-486.

Saltzman-Benaiah, J. & Lalonde, C.E. (2007). Developing clinically suitable measures of social cognition for children: Initial findings from a normative sample. *The Clinical Neuropsychologist, 21*, 294-317.

Sanson, A. Hemphill, S.A., & Smart, D. (2004). Connections between temperament and social development: A review. *Social Development, 13*, 142-170.

Sanson, A., Letcher, P., Smart, D., Prior, M., Toubourou, J.W., Oberklaid, F. (2009). Associations between childhood temperament clusters and later psychosocial adjustment. *Merrill-Palmer Quarterly, 55,* 1-19.

Senn, T.E., Espy, K.A., Kaufman, P.M. (2004). Using path analysis to understand executive function organization. *Developmental Neuropsychology, 26*, 445–464.

Shrout, P., & Fleiss, J. (1979). Intraclass correlations: Uses in assessing rater reliability. *Psychological Bulletin, 86*, 420-428.

Sijtsma, K. (2009). On the use, misuse, and the very limited usefulness of Cronbach's alpha. *Psychometrika, 74*, 107-120.

Silver, C. 2000. Ecological validity in neuropsychological assessment in childhood traumatic brain injury. *Journal of Head Trauma Rehabilitation, 15,* 973-988.

Sternberg, S. (1966). High speed scanning in human memory, *Science*, *66,* 652–654.

Streiner, D.L. (2003). Starting at the beginning: An introduction to coefficient alpha and internal consistency. *Journal of Personality, 80,* 99-103.

Streiner, D.L. & Norman, G.R. (1995) *Health Measurement Scales. A practical Guide to their Development and Use.* 2. New York, NY: Oxford University Press Inc.

Stuss, D.T. & Benson, D.F. (1986). The frontal lobes. New York: Raven Press.

Teglasi, H. (2012). Essentials of TAT and other story telling assessments, Second Edition. New York: Wiley.

Teglasi, H., Cohn, A., & Meshbesher, N. (2004). Temperament and learning disability. *Learning Disability Quarterly, 27*, 9-19.

Teglasi, H. & Epstein, S. (1998). Temperament and personality theory: The perspective of cognitive-experiential self-theory. *School Psychology Review, 27*, 534-552.

Teglasi, H., Locraft, C., & Felgenhauer, K. (2008). Empathy: schemas and social information processing, In S. Jenkins (Ed), *A Handbook of Clinical Scoring Systems for Thematic Apperceptive Techniques.* Mahwah, N.J.: Lawrence Erlbaum Associates.

Teglasi, H., Nebbergall, A.J., & Newman, D. (2011). Construct validity and case validity in assessment. *Psychological Assessment*. Advance online publication. doi: 2011-0750 (z1t - 2416).

Thomas, A. (1977). Temperament and Development. New York: NY.

UCSF Memory and Aging Center (2008). Published on Frontotemporal Dementia (FTD). http://memory.ucsf.edu/ftd/overview/biology/executive/single. Created 11/13/2008

Vaughan Van Hecke, A. Mundy, P.C., Acra, C.F., Block, J.J., Delgado, C.E.F., Parlade, M.V., Meyer, J.A., Neal, A.F., & Pomares, Y.B. (2007). Infant joint attention, temperament, and social competence in preschool children. *Child Development*, *78*, 53-69.

Waters, E., & Sroufe, L. A. (1983). Social competence as a developmental construct. Developmental Review, 3, 79-97.

Webster-Stratton, C., Reid, M.J., & Stoolmiller, M. (2008). Preventing conduct problems and improving school readiness: Evaluation of the Incredible Years Teacher and Child Training Programs in high-risk schools. *Journal of Child Psychology and Psychiatry, 49,* 471- 488.

Wechsler, D. (2002). Wechsler Preschool and Primary Scale of Intelligence—3rd Edition *(WISC-III®)*. San Antonio, TX: Harcourt Assessment.

Welsh, M.C., & Pennington, B.F. (1988). Assessing frontal lobe functioning in children: Views from developmental psychology. *Developmental Neuropsychology*, 4, 199-230.

Welsh, M. C., Pennington, B. F., & Groisser, D. B. (1991). A normative-developmental study of executive function: A window of prefrontal function in children. Developmental Neuropsychology, 7, 131–149.

Yeates, K.O., & Selman, R.L. (1989) Social competence in the schools: Toward an integrative

developmental model for intervention. *Developmental Review*, 9, 64-100.