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Impact of Group Cognitive Behavior Therapy on Adolescents with Deficits in Inhibition

Jessica L. Morley

Philadelphia College of Osteopathic Medicine, jessicamo@pcom.edu

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Philadelphia College of Osteopathic Medicine

Department of Psychology

IMPACT OF GROUP COGNITIVE BEHAVIOR THERAPY ON ADOLESCENTS
WITH DEFICITS IN INHIBITION

By Jessica L. Morley

Submitted in Partial Fulfillment of the Requirements for the Degree of

Doctor of Psychology

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**PHILADELPHIA COLLEGE OF OSTEOPATHIC MEDICINE
DEPARTMENT OF PSYCHOLOGY**

Dissertation Approval

This is to certify that the thesis presented to us by Jessica Morley
on the 13th day of JANUARY, 2015, in partial fulfillment of the
requirements for the degree of Doctor of Psychology, has been examined and is
acceptable in both scholarship and literary quality.

Committee Members' Signatures:

George McCloskey, PhD, Chairperson

Virginia Burks Salzer, PhD

Ray Christner, PsyD

Robert A DiTomasso, PhD, ABPP, Chair, Department of Psychology

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Abstract

Existing literature connects impulse control dysfunction to high-risk behaviors and negative life outcomes. Evidence-based interventions for children and adolescents who are at-risk or who are displaying significant levels of impulsive behavior are necessary in order to promote self-control, and in turn, positive life outcomes. This study investigated the impact of an eight-week, school-based GCBT intervention on cognitive inhibition and behavioral impulsivity in adolescent participants. The intention of the study was to evaluate the trend in inhibition and impulsivity from baseline to post-intervention assessments across five middle school students dually enrolled in a residential treatment facility and a center-based emotional support program. Although conclusive statements regarding the effects of the intervention program on the adolescent participants were unable to be made because of the small sample size and the absence of a control group, trends in the data suggest that the intervention had a positive impact on the behavior of four of the five student participants.

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Chapter 1: Introduction

Introduction

Impulsivity, largely a behavioral response, is defined as a rapid and unplanned reaction to internal or external stimuli without concern for negative consequences that may result from the reaction (Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001); however, inhibition, largely a cognitive process, can be defined simply as the suppression of a dominant or automatized response (Best, Miller, & Jones, 2009). Inhibition is a self-regulatory executive capacity, and impulsivity is the behavioral manifestation of a deficient inhibitory circuit.

Although the capacity to inhibit behavioral responses can vary between same-age peers, inhibition of impulsive behavior also fluctuates within an individual based on factors including emotional state, the nature of the response being made, and the dominance of the suppressed response (Best et al., 2009). Inhibition matures throughout the later phase of childhood and adolescence, and thus, as the inhibitory circuits of the frontal lobe mature, an individual could be expected to have greater control over his or her behavioral responses (Best et al., 2009).

Existing literature connects impulse control dysfunction to high-risk behaviors and negative life outcomes. Symptoms such as a sense of urgency, lack of determination and lack of forethought have been linked to substance dependency (Verdejo-Garcia, Bechara, Recknor, & Perez-Garcia, 2007). These symptoms significantly predict the impact of substance abuse on an individual's health, employment status, legal problems, family and social problems, and the presence of comorbid psychiatric conditions (Verdejo-Garcia et al., 2007). In addition, the presence of clinically significant levels of

impulsivity in an individual is a predictor of cocaine use and treatment retention (Moeller et al., 2001), as well as a risk factor for the occurrence of binge eating disorder and complications with recovery from eating disorders (Fernandez-Aranda et al., 2008). Additionally, children and adolescents with inhibition deficits are at significant risk for interference in meeting developmental milestones with regard to academic, social, and emotional competencies (Kendall & Braswell, 1993). Students who engage in impulsive behavior are more likely than their non-impulsive counterparts to be referred for evaluations in the school setting and outpatient setting (Kendall & Braswell, 1993). Furthermore, adolescents with deficits in inhibition are more likely to engage in risk-taking behavior, including experimentation with drugs and alcohol (Muresanu, Stan, & Buzoianu, 2012; Steinberg, 2007).

Disorders that are primarily characterized by impulsive behavior such as Attention Deficit Hyperactivity Disorder (ADHD), Oppositional Defiant Disorder (ODD), and Conduct Disorder (CD) are highly prevalent in the United States, with primary onset throughout childhood and adolescence. Impulse control disorders have a lifetime prevalence of 24.8% with a median age of onset at 11 years of age (Kessler, Berglund, Demler, Jin, Merikandas, & Walters, 2005). When compared with other diagnostic clusters, impulse control disorders are less prevalent than only anxiety disorders, in which the prevalence is 28.8% of Americans (Kessler et al., 2005). Given this prevalence rate and the risk-taking behavior and negative life outcomes associated with such behavior, early intervention becomes necessary in order to detract children from impulsive tendencies.

Although one in two adolescents with comorbid or severely disabling mental disorders have never received mental health treatment, those with externalizing disorders are more likely than children and adolescents with anxiety disorders, eating disorders, or substance use disorders to have received mental health treatment (Merikangas et al., 2011). Despite this encouraging statistic, approximately only one-half of adolescents with ADHD, behavior disorders, or substance use disorders have received more than six mental health outpatient visits in their lifetimes (Merikangas et al., 2011).

Statement of the Problem

The research connecting impulsivity to adverse life outcomes provides professionals with a behavioral indicator for the population of children and adolescents who would benefit from prevention and intervention in developing the capacity to inhibit behavior. More than half of the students in the United States who are exhibiting clinically significant levels of impulsivity are receiving a limited number of treatments in outpatient settings, which is likely not sufficient to learn, practice, and generalize successful inhibitory control.

Children and adolescents with dysfunctional inhibitory systems tend to be disruptive to the classroom setting, which creates a less than optimal learning environment for them and for their peers. Disruptive behavior also tends to interfere with the development and maintenance of relationships with peers and adults in the school setting, which in turn creates a lack of connectivity between the student and his or her school.

Most children and adolescents with impulse control dysfunction are not receiving the frequency and duration of mental health treatment through outpatient setting that is

most likely needed to gain inhibitory control across home, school, and community settings. Because children and adolescents spend much of their time in the school setting, integrating targeted interventions for impulse control into school settings would provide more students with access to the appropriate frequency and duration of support.

Purpose of the Study

The current study seeks to investigate the neuropsychological and behavioral outcomes of a Group Cognitive Behavioral Therapy (GCBT) Intervention Program that was specifically designed for teaching inhibitory skills and generalizing learned inhibitory control over behavior in the school setting. The study will investigate whether or not the students who participated in this GCBT intervention demonstrated an increase in inhibitory control on direct measures of inhibition, and a reduction in the frequency of impulsive behavior in the school setting.

Chapter 2: Review of the Literature

Introduction

Prior to reviewing the data of a school-based cognitive-behavioral intervention program designed for the reduction of the impulsive behavior, multiple factors were reviewed and considered. This chapter will provide an overview of these considerations including a review of the factors surrounding implementation of school-based mental health programs, the research on cognitive behavior therapy implemented with impulsive youth, and finally, a review the underlying neurological mechanisms of inhibition, including how cognitive dysfunction could be circumvented through targeted intervention to improve the behavioral response. The conclusion of this chapter will review the research questions and the hypotheses being investigated.

School-Based Mental Health

In recent years, schools have been charged with expanding their role of imparting instruction beyond academics to include that of teaching social-emotional and coping skills as well (Christner, Kamon, & Mennuti, 2012). Schools are expected to intervene with students who display emotional and behavioral difficulties in order to remove emotional and behavioral barriers that influence making adequate progress through the general education curriculum (Christner et al., 2012). In the era of response to intervention, schools are oriented toward taking intervention beyond a treatment-oriented approach to include preventative services to students who are at-risk, yet have not yet met full criteria for mental health disorders (Christner et al., 2012). Integrating school-based mental health services into both regular education and special education programming is becoming an expected piece of the culture of schools because of these factors.

From a student-centered perspective, schools function as part of a student's microsystem, where development takes place and is highly dependent on the content and structure within such a setting (Bronfenbrenner, 1994). Enhancing the content of this setting to include mental health supports enhances the social, emotional, and academic developmental processes of students. In contrast to outpatient mental health services, school-based services expand the responsibility of conducting the social-emotional intervention to include various adults within the microsystem of the school including teachers, administrators, school counselors, school psychologists and family members; these individuals support the student to generalize the skills learned during sessions (Christner et al., 2012).

Another benefit of school-based mental health services is access. Positioning mental health services in the school setting provides access to the majority of children and adolescents in a community, and provides the opportunity for supporting and monitoring students while they generalize skills learned during treatment into their daily lives (Klontz, Bivens, Michels, DeLeon, & Tom, 2015; Chronis, Jones, & Raggi, 2006; Evans, Langberg, & Williams, 2003). School-based services have been noted not only to promote academic and social-emotional functioning in the short-term (Montanez, Berger-Jenkins, Rodriguez, McCord, & Meyer, 2015; Klontz et al., 2015; Crisp, Gudmundsen, & Shirk, 2006), but also to prevent long-term negative life outcomes such as substance abuse and recurrent mental health problems throughout an individual's lifetime (O'Leary-Barratt et al., 2013). Providing a means for all students to access these short-term and long-term goals is critical.

The seemingly simplistic vision of implementing mental health services in schools becomes increasingly complex as systems attempt to take on the difficult task of adjusting interventions to fit the school culture (Christner, Forrest, Morley, & Weinstein, 2007). For example, schools are charged with providing evidence-based instruction to students across academic, behavioral, and social-emotional domains. In the realm of social-emotional and behavioral interventions, cognitive behavior therapy (CBT) is considered an evidence-based practice. CBT has had positive effects on children and adolescents with a number of common clinical disorders including anxiety, depression, oppositional defiant disorder, and attention deficit hyperactivity disorder (ADHD) (Mennuti & Christner, 2012). Although there is evidence to support implementation of CBT interventions with youth in clinical settings, there is also evidence of limited resources on the implementation of CBT in schools (Mennuti & Christner, 2012). Thus, there is a need for additional resources that incorporate evidence-based practices designed for the school setting. Furthermore, most schools have mental health professionals who work in different capacities with students; however, not all of these professionals have training in CBT. Although the utilization of manualized evidence-based CBT interventions delivered by school-based mental health professionals who do not have prior formal training in CBT has shown to be effective (Ginsberg, Becker, Kingery & Nichols, 2008), the aforementioned limitation of resources designed for school use provides additional challenges to school systems.

Cognitive Behavior Therapy Targeting Impulsive Behavior

Research on CBT with children and adolescents has been focused predominantly on determining effectiveness within specific diagnostic populations rather than on

clusters of individuals exhibiting a specific dysfunctional characteristic, such as impulsivity. ADHD is most frequently associated with the dysfunctional trait of impulsive behavior because individuals with this disorder tend to have difficulty modulating their behavioral responses to environmental demands (Abikoff, 1985). CBT effects on children with ADHD have had limited empirical support (Abikoff, 1985; Bloomquist, August, & Ostrander, 1991).

Research investigating the effects of cognitive therapy with children displaying clinically significant levels of impulsive behavior has been ongoing since the 1970s. Abikoff (1991) conducted a meta-analysis of the early research investigating cognitive therapy with children diagnosed with ADHD. The goal of cognitive therapy with this population was to develop self-regulatory and problem solving skills in order to modify impulsive responding (Abikoff, 1991). Early researchers were investigating cognitive impulsivity and behavioral impulsivity as two separate constructs, and hypothesizing that a reduction in impulsivity on a direct measure of cognitive impulsivity would not necessarily correlate with a reduction in behavioral impulsivity (Abikoff, 1991). The conclusion of the meta-analysis was that cognitive therapy was ineffective with children diagnosed with ADHD.

In addition to his literature review, Abikoff conducted his own research in the early 1990s. For two years in the early 1990s, Abikoff and colleagues collected data on a multimodal therapeutic intervention with children ages 7-9 who had been diagnosed with ADHD according to the criteria set forth in the DSM-III-R. These children were divided into three treatment groups, including methylphenidate medication alone, methylphenidate plus a multi-modal psychosocial treatment, or a methylphenidate plus

attention control treatment. The multi-modal psychosocial treatment was composed of individual academic assistance, organizational skills training, individual psychotherapy, social skills training, reading intervention, parent management training, and daily teacher report cards for the home-based reinforcement component (Abikoff et al., 2004). The attention control treatment included the formal components of the multi-modal psychosocial treatment, but excluded the social skills training. The treatment was provided after school in one of two different clinical settings. Outcomes were measured with the Social Skills Rating Scale, the Taxonomy of Problem Situations, and direct observation, using the Social Interaction Observation Code on two occasions during each assessment period during gym class (Abikoff et al., 2004). The results indicated that no treatment gains were made when the sample was provided with the multimodal intervention; however, over time parent and teacher ratings of social functioning improved (Abikoff et al., 2004). The study indicated that due to the lack of untreated control groups, maturational changes could not be ruled out as an intervening factor (Abikoff et al., 2004). Therefore, the results of the study indicated that neither medication alone or in combination with psychosocial treatment was effective in addressing dysregulated social behavior (Abikoff et al., 2004).

Further, a series of studies initiated by the Multimodal Treatment of ADHD Study (1999) investigated the effects of medication alone, compared with medication plus cognitive behavior therapy. Results of the original study, and follow-up studies (van der Oord, Prins, Oosterlaan, & Emmelkamp, 2007; van der Oord, Prins, Oosterlaan, & Emmelkamp, 2008) indicated no difference between treatment groups in the short-term. Longitudinal studies of both original treatment samples were also conducted, and found

that children in the combined medication and cognitive behavior therapy group were prescribed a lower dosage of medication at follow-up, compared with the children in the medication only treatment group (van der Oord, Prins, Oosterlaan, & Emmelkamp, 2012). Thus, these findings suggest that adding the cognitive behavior therapy component had an effect on the dosage of medication that individuals were prescribed years later.

Seemingly in contrast to early research, Robinson and colleagues (1999) conducted a meta-analysis that provided strong evidence for the efficacy of school-based cognitive-behavioral interventions with hyperactive-impulsive and aggressive youth. The analysis indicated that cognitive-behavioral interventions were not only most influential on reducing hyperactive-impulsive behavior, but also impacted aggressive behavior. Additionally, a portion of the studies found treatment effects at one to three months post treatment. When examined more closely, these findings are actually compatible with Abikoff's (1985) ideas, because he indicated cognitive behavioral strategies, including self-monitoring and self-reinforcement were effective with ADHD populations, but that in order for these strategies to demonstrate clinical utility, generalization of treatment effects needed to be demonstrated. He went on to state that in order for the occurrence of generalization in home and school settings, these settings need to be actively involved in the cognitive training (Abikoff, 1985). Abikoff suggested training of parents and school staff in the rationale and strategies of the intervention, as well as training for positive reinforcement of the students' attempts at self-control (Abikoff, 1985). Thus, the research prior to the turn of the millennium suggested that CBT with children and

adolescents with ADHD was ineffective, unless the intervention was delivered in the natural environment of the individual, such as the school setting.

Another diagnostic category frequently described as impulsive is Conduct Disorder (CD). Kendall and colleagues (1990) found statistically significant treatment effects with students diagnosed with CD when using CBT, as compared with a psychodynamic therapeutic approach. Improvement in teacher and self-report ratings of self-control, prosocial behavior, and social competence were found; however, significant changes on norm-referenced rating scales were not observed (Kendall et al., 1990). Thus, the effect of CBT in this study was found in the development of prosocial behavior, and not on disruptive behavior.

More recently, research has shifted from conducting CBT with specific diagnostic populations to include investigations with groupings of individuals with similar dysfunctional behaviors. An investigation conducted by O'Leary-Barrett and colleagues (2013) measured the immediate and long-term outcomes of a brief, personality-targeted cognitive-behavioral group therapy prevention program facilitated in the school setting. They found that targeting specific personality traits, including a group of adolescents exhibiting impulsivity, not only reduced the likelihood of future substance abuse, but also decreased the presence of theoretically linked behaviors. In particular, the students between 13 and 14 years of age, who were identified as impulsive, displayed significantly decreased frequency of conduct-disordered behaviors, compared with matched controls (O'Leary-Barrett et al., 2013).

Research has demonstrated that impulsivity (Paaver et al., 2006; Jonah, 1997; Begg & Langley, 2004; Barkley & Cox, 2007), low risk awareness (McKnight &

McKnight, 2003, Deery, 1999), and thoughtless risk taking (Clarke et al., 2005) are predictive characteristic of an individual engaging in high risk driving. An interesting body of research conducted with impulsive teenagers who engage in angry driving and risk-taking behavior demonstrated that introducing cognitive-behavior therapy concepts had a significant effect on speeding violations in the year following intervention, compared with matched controls (Paaver et al., 2013). Specifically, educating adolescents about impulsivity as a personality trait, exploring subtypes of impulsivity within themselves, and identifying triggers for engaging in impulsive behavior were included in the intervention.

A few important points can be taken from this review of literature on CBT with impulsive children and adolescents. First, CBT with children diagnosed with ADHD conducted in a clinical setting has not been shown to have empirical support. However, it is important to note the lack of consideration for ADHD subtype included in the studies that did not support the use of CBT with ADHD youth. The DSM-III-R was used for the inclusionary criteria in study conducted by Abikoff et al. (2004). The DSM-III-R criteria for ADHD did not separate ADHD into subtypes, which would explain the lack of consideration for this factor in Abikoff's research. However, ADHD subtype is a critical factor to examine when investigating the effectiveness of an intervention. During an investigation of medication effects with ADHD children and adolescents, Hale et al. (2011) discussed ADHD subtypes as neurologically divergent disorders. The results of this study indicated that participants with ADHD-Inattentive Type were less likely to respond to the methylphenidate medication than those with ADHD-Combined Type, suggesting that there are multiple neurological causes to a behavioral presentation of

attention deficit (Hale et al., 2011). Heterogeneous samples collapse differences between groups, and as a result, may not uncover significant gains by specific subgroups of a population.

Second, CBT conducted in the school setting with students diagnosed with ADHD has empirical support. Furthermore, CBT has shown to be effective when adolescents have been grouped based on the behavioral trait of displaying impulsive behavior. Thus, the review supports the investigation of a school-based CBT program for students displaying impulsive behavior.

Underlying Neurological Mechanisms of Inhibition and Implications for Intervention

The research that has been reviewed thus far has supported school-based cognitive-behavioral intervention with symptom-based groupings; however, it is also important to understand the cognitive dysfunction that is resulting in the impulsive behavior in order to determine the best approach for intervention. Researchers in the field of cognitive neuropsychology revealed that subcortical regions of the brain are responsible in part for regulating impulsive behavioral and cognitive responding (Koziol & Budding, 2009).

Cortical-subcortical loop. Behavior is initiated and inhibited by a particular cortical-subcortical loop that begins and ends in the cortices of the frontal lobes, but is controlled by a gating system in the subcortical regions of the basal ganglia, thalamus, and cerebellum (Koziol & Budding, 2009; Muresanu et al., 2012). Dysfunction in this gating system causes either extremely inhibited or extremely disinhibited presentations, more commonly referred to as psychiatric disorders. When the gating system is overly

inhibited, the person will present as withdrawn or disengaged. This occurs when the gating system will not allow the behavior to activate, or more precisely disinhibit.

Conversely, when the gating system is overly disinhibited, and therefore, not selective enough, the person appears hyperactive, impulsive, or compulsive.

Not only is the basal ganglia implicated for stopping behavior and permitting behavior to be exhibited, the basal ganglia is also connected through circuitry to the substantia nigra pars compacta (SNpc), which is a primary site for dopamine production (Koziol & Budding, 2009). The release of dopamine causes cellular changes to occur in the brain, resulting in newly learned associations with an event (Muresanu et al., 2012). Dopamine serves two functions including signaling the person to important novel stimuli, which then facilitates learning, and also alerts the person to a familiar and motivationally important event (Muresanu et al., 2012). Thus, many of the symptoms observed in inhibition-based disorders may be reflecting problems within the dopaminergic system. For this reason, immediate reinforcement of appropriate behavior promotes the likelihood of that behavior occurring in the future.

Frith (1992) researched the symptoms of schizophrenia in relation to an inability to regulate behavior. He discussed the idea that behavior, or output action, is determined by two pathways, including those that are willed and those that are stimulus driven (as cited in Torres, O'Leary, & Andreasen, 2003). The willed pathway acts in a goal-directed manner, and is initiated by transferring internally generated intentions into actions that are consistent with the goals (Torres, O'Leary, & Andreasen, 2003). In contrast, the stimulus driven pathway is initiated by environmental stimuli that promote behavior that is not necessarily consistent with the person's goals (Torres, O'Leary, &

Andreasen, 2003). Therefore, to accomplish a goal, one must initiate the willed action pathway while concurrently suppressing the stimulus-driven pathway (Torres, O’Leary, & Andreasen, 2003). Individuals with deficits in inhibition are more likely to follow the stimulus driven pathway and engage in behavior that is not consistent with their goals. Thus, using CBT strategies such as goal setting, self-monitoring, and self-talk are important aspects of learning to inhibit the stimulus-driven pathway and initiate the willed action pathway.

Prefrontal cortex. The prefrontal cortex is implicated in mediating and directing cognitions. The prefrontal cortex lies anterior to the motor and supplementary motor cortices, and is divided into three areas, including the dorsolateral prefrontal cortex (DLPFC), the orbitofrontal cortex (OFC), and the anterior cingulate or medial frontal cortex (MFC) (Koziol & Budding, 2009). The DLPFC is responsible for focusing attention, inhibiting inappropriate responses, providing working memory for planning and organizing, and also programming behaviors in order to solve novel problems (Koziol & Budding, 2009). The OFC has two circuits, including the medial and lateral OFC. The medial OFC has reciprocal connections to the limbic system and insula, and is believed to integrate and modulate instinctive drives (Koziol & Budding, 2009). The lateral OFC is involved in personality, including inhibition, impulsivity, irritability, and emotional liability (Koziol & Budding, 2009). The OFC plays a role in linking emotional responses to cognition (Pinel & Edwards, 2008). Last, the MFC is involved in motivation and drive, and is thought to play a part in continuously monitoring and controlling behavior to ensure that the behavior is in line with one’s intentions (Koziol & Budding, 2009; Pinel & Edwards, 2008). The orbitofrontal and medial prefrontal areas

also participate in monitoring one's own behavior, encoding self-relevant information, and inferring and monitoring the mental states of others (Pinel & Edwards, 2008).

Therefore, impulsive behavior may be the result of a dysfunctional DLPFC, which is behaviorally similar to many characteristics of ADHD, or dysfunction in the OFC, which is behaviorally similar to many characteristics of ODD and CD. Some individuals may have deficiencies in both of these prefrontal cortex regions, resulting in difficulties with both non-emotionally charged and emotionally charged impulsivity. Last, the MFC is implicated in the self-regulation aspect of learning to inhibit impulsive behavior. Some individuals are self-aware and able to monitor their responses; however, others need to improve upon their self-regulatory skills. Thus, a seemingly unitary behavioral construct can be displayed by the way of various deficient pathways in the brain. The intervention, therefore, needs to incorporate skill building to address deficits in emotionally charged behavioral impulsivity and environmentally stimulated impulsivity in order to obtain goal-oriented self-monitoring and inhibited behavior.

Basal ganglia and limbic system. From the prefrontal cortex, signals are sent reciprocally to the basal ganglia via feedback loops (Koziol & Budding, 2009). The DLPFC connects to the dorsal lateral head of the caudate; the OFC connects with the ventral striatum, and the MFC connects with the nucleus accumbens (Koziol & Budding, 2009). When thinking about the basal ganglia, associations to motor inhibition and disinhibition are common, and as a result, much of the literature regarding the basal ganglia feedback loops discusses the processes in terms of behavior. Depending upon whether behavior is to be initiated or inhibited, the basal ganglia filters information through one of three pathways including the direct, indirect, and subthalamic pathways to

the thalamus and back to the cortex (Koziol & Budding, 2009). The direct pathway is involved in initiating wanted behavior, and the indirect pathway is involved in inhibiting unwanted behavior (Koziol & Budding, 2009). The subthalamic pathway projects from the cortex to the subthalamic nucleus, bypassing the striatum, in order to inhibit impulsive behavior (Koziol & Budding, 2009). The basal ganglia, therefore, is highly involved with the intention of behavior (Koziol & Budding, 2009).

In addition to inhibition and disinhibition of behavior, the basal ganglia is also involved in gating cognitions or thoughts (Koziol & Budding, 2009). Therefore, when functioning appropriately the direct pathway initiates positive or productive thoughts, and conversely will filter out unwanted or unproductive thoughts. Last, if a person generates an inappropriate thought impulsively, the subthalamic pathway would quickly activate in order to inhibit this impulsive statement.

Impulsive behavior can be viewed through verbal and physical responses. Both verbally impulsive statements and physically impulsive actions are gated by the basal ganglia. When the indirect pathway does not inhibit unwanted thoughts or intentions of action, and the subthalamic pathway does not engage to inhibit the impulsive drive, the behavior or verbal response is elicited. Circumventing these deficient pathways will be necessary when intervening with impulsive individuals. Using the direct pathway to initiate thoughts that will inhibit behavioral responses will be critical to the success of the intervention.

Current Study

Research question. The current study examined the effectiveness of a school-based GCBT program for adolescents with deficits in impulse control. The study

reviewed archival data that were collected on five students across baseline, intervention, and post-intervention phases of implementation in order to determine the effectiveness of the intervention on cognitive inhibition and behavioral impulsivity. The following research questions were addressed:

1. Did participants demonstrate increased cognitive inhibition at post-intervention compared with their functioning at baseline?
2. Did participants demonstrate a reduction in the frequency of impulsive behavior at post-intervention compared with their functioning at baseline?

Hypothesis. Following the eight-week intervention period, participants will demonstrate increased cognitive inhibition and a reduction in the frequency of observed impulsive behavior in the school setting.

Chapter 3: Method

Overview

Five middle school students enrolled in a supplemental emotional support program participated in an eight-week, school-based GCBT program targeting impulse control. The intervention was conducted during the school day, and the students' progress was monitored through cognitive assessment, teacher survey, classroom observation, and discipline records. The study sought to investigate whether or not changes were observed in the data collected on impulsive behavior and cognitive inhibition during the intervention period.

Data Source

Shelf data collected over the course of the implementation of the school-based GCBT program, which was developed and facilitated by this investigator, were utilized for this study. The group was conducted with middle school students attending a center-based, supplemental emotional support program in the Mid-Atlantic Region of the United States. The supplemental emotional support program consisted of 81 students, 25 of whom were middle school students. Of the 25 students, 22 were male and three were female; 48% were African American; 40% were European American, and 12% were Hispanic. All students in this program had previously been diagnosed with psychiatric disorders, and were concurrently receiving therapeutic intervention and medication management at a local residential treatment facility. The school's mental health specialist had referred the students by selecting individuals who exhibited a high frequency of impulsive behavior, based on observation across the school setting. These students are referred to here as "Chris," "Nick," "Anthony," "Rebecca," and "Tonya".

Chris was a Caucasian 13-year-old student in seventh grade at the time of the group and data collection. Chris was receiving special education services under the classification of Emotional Disturbance. Chris had been diagnosed with Mood Disorder NOS, and Rule Out Attention Deficit Hyperactivity Disorder (ADHD), Combined Type, and was prescribed medication at the time of the group selection. He presented with a history of significant behavior problems since the age of five, including physical and verbal aggression, destruction of property, and a history of aggression toward animals. Chris' impulsive behavior increased in frequency and intensity across home and school settings throughout his childhood and into his adolescence. Since the time Chris was in second grade, he had been admitted to multiple psychiatric hospitals, residential treatment facilities, and partial hospitalization programs. His family had a significant history of drug and alcohol abuse, depression, anxiety, and ADHD. Chris underwent a psychological evaluation prior to the intervention, and was observed to be a student with average ability in reasoning, memory, and processing abilities.

Nick was a 13-year-old Caucasian student in eighth grade at the time of the group and data collection. Nick had been identified as a student eligible for special education services under the classification of Autism. Nick had been diagnosed with multiple psychiatric disorders including Mood Disorder NOS, Attention Deficit Hyperactivity Disorder (ADHD), and Asperger's Disorder. He had a significant history of physical aggression and severe violent behavior toward his younger brother. By 2010, Nick had been hospitalized on three occasions. According to his educational record, the possibility that Nick had been the victim of sexual abuse during his childhood could not be ruled

out. Previous cognitive assessments in his records indicate that Nick was a student with average to superior reasoning, memory, and processing abilities.

Anthony was a 15-year-old African American student in eighth grade at the time of the group and data collection. Anthony was receiving special education services under the primary classification of Other Health Impairment and secondary classification of Speech and Language Impairment. Anthony had been diagnosed with Bipolar Disorder, NOS, Attention Deficit Hyperactivity Disorder (ADHD), Combined Type, Intermittent Explosive Disorder, and Conduct Disorder, Adolescent Onset. Anthony was exposed to drugs and alcohol in utero, was adopted when he was three days old, and began receiving special education services through early intervention. According to his records, Anthony was a witness to a homicide and a home burglary when he was a child. Anthony stutters when he speaks; because of this he has been the victim of physical and verbal bullying by his peers. Anthony has a history of exhibiting aggressive behavior toward others and towards objects. When his cognitive abilities were assessed prior to the intervention period, Anthony demonstrated average to below average reasoning, memory, and processing abilities.

Rebecca was a 14-year-old African American student in eighth grade at the time of the group and data collection. Rebecca was receiving special education services under the classification of Emotional Disturbance. Rebecca had been diagnosed with Conduct Disorder, Childhood Onset, Mood Disorder, NOS, Physical Abuse (victim), and sexual abuse (victim). She had a history of verbal aggression, and physical aggression toward others and toward objects. Rebecca witnessed her mother using illegal substances, and as a result was raised by her grandmother since she was five years of age. At six years of

age, Rebecca experienced recurring febrile seizures. Since 2001, Rebecca has been admitted to multiple psychiatric hospitals and residential treatment facilities. Rebecca's cognitive profile was assessed prior to the intervention, and was observed to be largely within the below average range in the areas of reasoning, memory, and processing abilities. It was also noted that Rebecca has a history of truancy, including 40 absences from school during the 2009-2010 school year, and 27 absences during the 2010-2011 school year.

Tonya was a 13-year-old African American student in seventh grade at the time of the group and data collection. Tonya was receiving special education services under the primary classification of Emotional Disturbance. Tonya had been diagnosed with Oppositional Defiant Disorder, ADHD, Combined Type, and Reactive Attachment Disorder, Inhibited Type. Tonya was a ward of the state, and had been in 14 foster homes since she was four years of age. She was the victim of physical abuse by her father, and possibly the victim of sexual abuse. Tonya has a history of exhibiting aggressive behavior toward others and towards objects, stealing, running away, and resistance towards authority figures. She has been admitted on multiple occasions to psychiatric hospitals, partial hospitalization programs, and residential treatment facilities. Prior to the intervention, Tonya's cognitive abilities were measured. The scores were scattered between the below average and average ranges within indices of reasoning, memory, and processing speed.

Research Design

This study utilized a single case experimental design with shelf data from five participants attending a center-based, supplemental emotional support program in the

Mid-Atlantic region of the United States. The study investigated the effects of a school-based GCBT on behavioral impulse control and cognitive inhibition in adolescents over an eight-week intervention period. The study examined cognitive assessment data administered at baseline and post-intervention phases of the study to identify changes in cognitive inhibition. Additionally, at the baseline, mid-intervention and post-intervention phases of the study, Likert-scale surveys were administered to homeroom teachers, and classroom observations were conducted to investigate changes in behavioral impulse control. Last, student discipline records were reviewed from baseline to post-intervention phases to investigate residual effects on the frequency of inappropriate behavior in the school setting.

Measures and Materials

NEPSY-II Auditory Attention and Response Set subtest. The Auditory Attention and Response Set (AARS) subtest is included in the Attention and Executive Functioning domain of the NEPSY-II, a comprehensive assessment battery of neuropsychological functions (Korkman, Kirk, & Kemp, 2007). The AARS is a standardized, norm-referenced assessment, which is divided into two sections, first the Auditory Attention section, followed by the Response Set portion. The Auditory Attention task is normed on children ages 5-16, designed to measure auditory selective and sustained attention (Korkman et al., 2007). The Response Set task is normed on children ages 7-16, and was developed to measure cognitive shifting, inhibition, and maintaining set, in addition to auditory selective and sustained attention (Korkman et al., 2007).

The AARS includes primary measures for total correct responses; it also provides process scores for omission, commission, and inhibitory errors. Omission errors are indicated when there is an absence of a response to a target word, most likely as a result of lack of sustained attention toward the auditory information being presented during the subtest (Kemp & Korkman, 2010). Commission errors occur when a response is present in the absence of a target word, when an incorrect response is given, or when more than one correct response is given after a target word. (Kemp & Korkman, 2010). Commission errors are typically the result of uninhibited responding. Inhibitory errors occur when an incorrect response is given after a target word is presented; this is also likely the result of uninhibited responding (Kemp & Korkamn, 2010). Combined and contrast scores are also derived from this subtest; both provide information regarding the significance of any differences that may be present in the score profiles of an individual subject. The AARS scores are reported in percentile ranks and scaled scores. Table 1 provides classification categories for ranges of percentile ranks and scaled scores on the AARS.

Table 1

<i>Classifications for Scaled Scores and Percentile Ranks on the NEPSY-II</i>		
	Scaled Score	Percentile Rank
Above Expected Level	13-19	>75
At Expected Level	8-12	26-75
Borderline	6-7	11-25
Below Expected Level	4-5	3-10
Well Below Expected Level	1-3	<2

The AARS subtest was administered to the students during the baseline and post-intervention phases of the study by a nationally certified school psychologist, trained in the administration and interpretation of this measure, who also served as the group intervention facilitator and main investigator of this research.

D-KEFS Color-Word Interference subtest. The Color-Word Interference subtest is one of nine co-normed, stand-alone tests of executive functions included in the Delis-Kaplan Executive Function System (D-KEFS) (Delis, Kaplan, & Kramer, 2001). The Color-Word Interference subtest is a standardized, norm-referenced assessment that was designed to measure inhibition of automatic verbal responses and cognitive flexibility (Delis et al., 2001). Additionally, two measures of rapid automatic naming are also obtained in order to rule out a deficit in this skill, which would also influence the examinee's performance on the primary tasks of this assessment. This test has been normed on individuals ages eight through 89.

The Color-Word Interference task results in primary measures for the completion times of four conditions including Color Naming, Word Reading, Inhibition, and Inhibition/Switching, in addition to contrast measures for these conditions. Performance on these conditions is demonstrated through scaled scores, which have a mean of 10 and a standard deviation of three. Additionally, optional measures are provided for contrasting completion times on various pairings of the primary conditions, and also for analyzing the error patterns in the examinee's performance across conditions. A combination of scaled scores and cumulative percentile ranks are used for these optional measures. Cumulative percentile ranks describe the percentage of the normative sample that earned raw scores equivalent to or worse than the raw score obtained by the

examinee (Delis et al., 2001). Thus, a cumulative percentile rank of 75 indicates that 75% of the normative sample performed similarly or worse than the examinee on the task. The Color-Word Interference subtest was administered to the students during the baseline and post-intervention phases of the study by a nationally certified school psychologist, trained in the administration and interpretation of this measure, who was also the group intervention facilitator and main investigator of this research.

Teacher survey forms. The teacher survey form included ten items presented in a Likert-type rating scale format. The items included statements for which the teacher was to respond “never,” “sometimes,” “often,” or “always,” in order to describe the student’s behavior in school during the preceding week. The items were developed to fit into one of four types of impulsive behavior addressed in the program, including three items related to verbal aggression, two items related to physical aggression, two items related to verbal interruption, and three items related to physical over activity. Teacher surveys were administered during the baseline, mid-intervention, and post-intervention phases of the study. The teacher survey form is provided in Appendix A.

Classroom observation forms. The classroom observation form provided space to tally six verbally impulsive behaviors and nine physically impulsive behaviors. Among the verbally impulsive statements, three items described verbal interruptions and three items described verbal aggressions. Included in the physically impulsive statement were two items describing physical aggressions and seven items describing physical over activity. The group facilitator and main investigator of this study conducted 20-minute observations during classroom instruction during baseline, mid-intervention, and post-

intervention phases of the study. The classroom observation form is provided in Appendix B.

Discipline record review. Student discipline records were reviewed in order to tally the number of discipline referrals that the student accumulated during the baseline, intervention, and post-intervention phases of the study.

Data Analyses

The data collected on each student was tabled including AARS and Color-Word Interference subtest results, behaviors displayed during classroom observations, and the accumulation of behavior referrals. These tables were examined for changes in assessment scores, as well as for trends in behavioral data. The presence of one standard deviation or more of change in cognitive assessment data from baseline to post-intervention data, and a decrease in behavioral trend lines determined a positive impact.

Chapter 4: Results

Descriptive Statistics

The data from five students were analyzed for the current study. The sample contained male and female students in seventh and eighth grades. All five students had been identified as students with educational disabilities and mental health disorders who were currently enrolled in a residential treatment facility. Eighty percent of the sample had exposure to traumatic events, which included being the victim of physical and sexual abuse, witnessing domestic violence, being the witness of parental drug abuse, and being present in the home during a murder and burglary. Table 2 provides a summary of the demographic characteristics of the sample.

Table 2

<i>Demographic Characteristics of Sample</i>		
	<i>n</i>	%
Gender		
Males	3	60
Females	2	40
Grade		
Seventh	2	40
Eighth	3	60
Educational Classification		
Emotional Disturbance	3	60
Autism	1	20
Other Health Impairment	1	20
Mental Health Diagnosis		
ADHD	4	80
Oppositional Defiant Disorder	1	20
Mood Disorder, NOS	3	60
Conduct Disorder	2	40
Bipolar Disorder, NOS	1	20
Reactive Attachment Disorder	1	20
Asperger's Disorder	1	20
Intermittent Explosive Disorder	1	20
Exposure to Traumatic Events	4	80

Cognitive Inhibition and Behavioral Impulsivity Data Results

Inhibition was measured at baseline and post-intervention using the AARS subtest from the NEPSY-II, and the Color-Word Interference subtest from the D-KEFS. The AARS subtest was used to measure inhibition of a behavioral response, and the Color-Word Interference subtest was used to measure inhibition of a verbal response.

Impulsivity was measured through classroom observations and teacher surveys during the baseline, mid-intervention, and post-intervention phases of the study. Data collected across both cognitive and behavioral domains are described collectively for each student.

Chris's Results.

AARS Subtest.

Chris presented with a deficit in auditory attention during the baseline administration of the AARS subtest that manifested through a significant frequency of omission of a behavioral response to auditory cues or a significant delay in behavioral response following the auditory cue. It was noted that Chris's selected and sustained attention improved significantly during the post-intervention administration. Chris did not present with a deficit in inhibitory errors at baseline or post-intervention. Table 3 includes Chris's results from the AARS subtest at baseline and post-intervention.

Table 3

Chris's Baseline and Post-Intervention Scores from the AARS

	Baseline %ile	Post-Intervention %ile
Auditory Attention		
Total Correct	11-25	51-75
Omission Errors	11-25	51-75
Commission Errors	6-10	26-50
Inhibitory Errors	26-50	26-50
Response Set		
Total Correct	6-10	11-25
Omission Errors	6-10	11-25
Commission Errors	11-25	>75
Inhibitory Errors	51-75	>75
	Baseline SS	Post-Intervention SS
Combined Scores		
Auditory Attention	3	12
Response Set	6	10

Note. AA = Auditory Attention; RS = Response Set; SS = Scaled Score.

Color-Word Interference Subtest.

Chris presented with a deficit in rapid automatic naming of colors and words during the baseline administration of the Color-Word Interference subtest. He progressed slowly through these basic tasks and committed errors. His performance was similar on the inhibition and inhibition/switching tasks, which suggests that his difficulty with rapid naming could have influenced his scores on the inhibition tasks. At post-intervention, the accuracy and speed of Chris's performance in rapid naming performance improved. Although the speed at which he performed the verbal inhibition task improved, he committed more errors which he did not correct. Thus, Chris is presenting with a pattern of performing the inhibition task quickly without correcting his errors, or slowly, and correcting some of his errors. Overall, Chris committed more errors across baseline and post-intervention assessments of verbal inhibition than those that would be expected for

his age. Table 4 includes Chris’s results from the Color-Word Interference subtest at baseline and post-intervention.

Table 4

Chris’s Baseline and Post-Intervention Scores from the Color-Word Interference Subtest

	Baseline Score	Post-Intervention Score
Color Naming		
Completion Time SS	4	7
Total Errors CPR	15	100
Word Reading		
Completion Time SS	6	9
Total Errors CPR	2	100
Inhibition		
Completion Time SS	4	7
Corrected Errors CPR	40	100
Uncorrected Errors CPR	12	2
Total Errors SS	7	5
Inhibition/Switching		
Completion Time SS	8	7
Corrected Errors CPR	35	48
Uncorrected Errors CPR	9	9
Total Errors SS	4	5

Note. SS = Scaled Score; CPR = Cumulative Percentile Rank; IN = Inhibition; CN = Color Naming; SW = Inhibition/Switching.

Teacher Survey.

At baseline, Chris’s teacher reported frequent occurrences of verbal aggression, verbal interruptions, and physical over-activity. In particular, Chris often yelled or screamed at others, teased or made rude comments, called out in class, interrupted others’ conversations and activities, left assigned areas without permission, and touched or took others’ belongings without permission. Only at times was Chris observed engaging in physical aggression in school. During the intervention period there was a slight decrease

in the observed frequency of leaving his assigned area; however, this behavior increased after the intervention period was concluded. At the post-intervention rating, Chris’s teacher indicated a slight reduction in his frequency of interrupting other people’s conversations and activities. Table 5 includes the results from the teacher survey at the baseline, mid-intervention, and post-intervention phases of the study.

Table 5

Teacher Survey of Chris’s Behavior in School

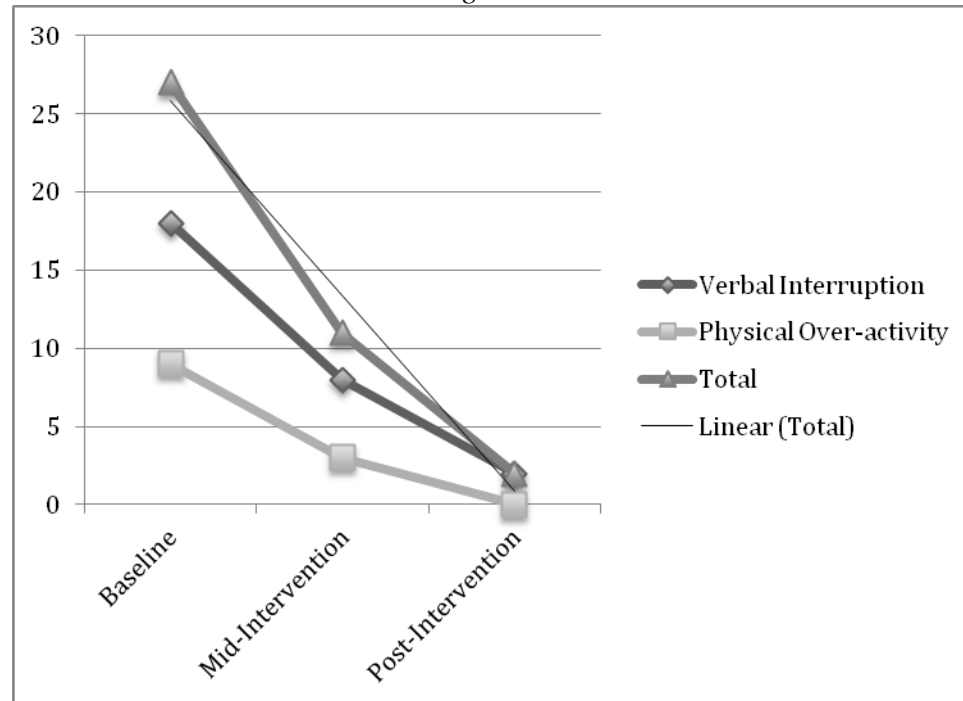
	Baseline Rating	Mid-Intervention Rating	Post-Intervention Rating
Verbal Aggression			
Curses at faculty and/or students	S	O	O
Yells/screams at others	O	O	O
Teases or makes rude comments to others	O	O	O
Physical Aggression			
Hits/kicks/punches others	S	S	O
Throws objects or destroys property	S	S	O
Verbal Interruption			
Calls out in class	O	O	O
Interrupts others’ conversations/games/activities	O	O	S
Physical Over-activity			
Leaves assigned area	O	S	O
Takes or touches others’ possessions	O	O	O
Leaves seat at inappropriate times	S	O	O

Note. N=Never; S=Sometimes; O=Often; A=Almost Always.

Classroom Observation.

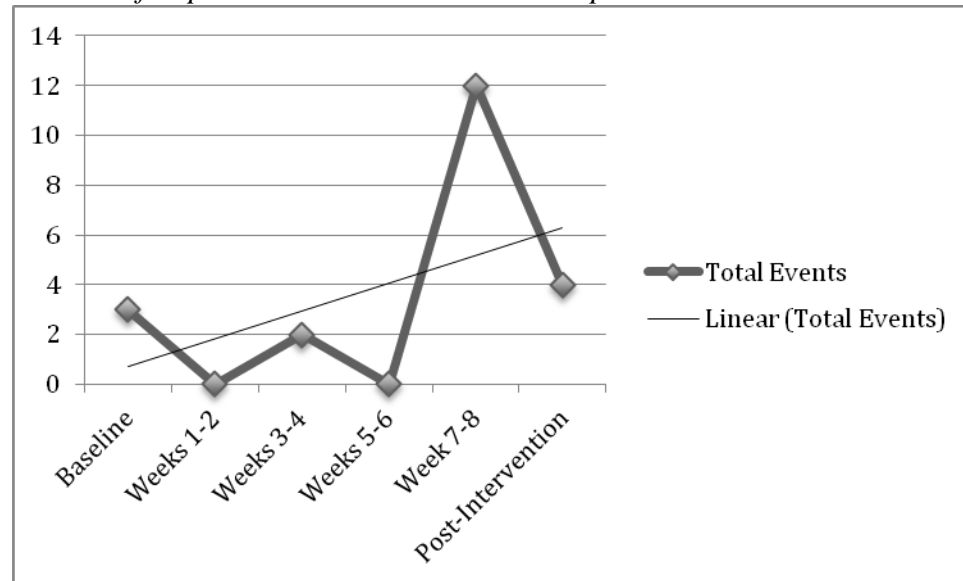
During the initial observation, Chris committed a remarkable number of verbal interruptions. These were characterized primarily by calling out in class and by interrupting others' conversations. He also demonstrated a marked number of behaviors categorized as physical over-activity. He frequently got out of his seat, stood at his desk, fidgeted with objects on his desk, and took others' belongings. A significant downward trend in behavior was noted both for verbal interruption and for physical over-activity during the classroom observations from baseline, to mid-intervention, to post-intervention. By the final observation period, Chris was observed talking in class on only two occasions. This was a significant change in his behavior. Figure 1 includes the results from the classroom observation at the baseline, mid-intervention, and post-intervention phases of the study.

Figure 1

Chris's Classroom Behavior During 20-minute Observations***Discipline Record.***

Chris's behavior in school fluctuated significantly throughout the intervention period. Although he earned only a total of three discipline referrals during the two weeks prior to the intervention, and then earned only a total of two discipline referrals during the first six weeks of the intervention, his behavior warranted 12 discipline referrals during the seventh and eighth weeks of the intervention. The two weeks following the intervention, Chris earned four referrals for his behavior. The overall trend in this data indicates that as the intervention progressed, the frequency of inappropriate school behavior increased as well. Figure 2 depicts the number of impulsive events on Chris's discipline record segmented in two-week intervals.

Figure 2

Number of Impulsive Events on Chris's Discipline Record**Nick's Results.*****AARS Subtest.***

Nick presented with average capacity to sustain auditory attention, as indicated by his scores across baseline and post-intervention administrations of the auditory attention portion of the subtest. He committed one error during this section on the baseline administration by responding to a non-target word. When instruction set increased in complexity, the demand on his working memory increased. Nick presented with a decline in his ability to inhibit physical responses to auditory information. His performance on this same task at post-intervention improved more than one standard deviation from his performance at baseline. Table 6 includes Nick's results from the AARS subtest at baseline and post-intervention.

Table 6

Nick's Baseline and Post-Intervention Scores from the AARS

	Baseline %ile	Post-Intervention %ile
Auditory Attention		
Total Correct	51-75	51-75
Omission Errors	51-75	51-75
Commission Errors	6-10	26-50
Inhibitory Errors	26-50	26-50
Response Set		
Total Correct	11-25	51-75
Omission Errors	11-25	51-75
Commission Errors	11-25	>75
Inhibitory Errors	11-25	>75
	Baseline SS	Post-Intervention SS
Combined Scores		
Auditory Attention	5	12
Response Set	6	12

Note. AA = Auditory Attention; RS = Response Set; SS = Scaled Score.

Color-Word Interference Subtest.

Nick demonstrated response inhibition toward visual information that was comparable to same-age peers at baseline and post-intervention. No deficits were found in this domain. Table 7 includes Nick's results from the Color-Word Interference subtest at baseline and post-intervention.

Table 7

Nick's Baseline and Post-Intervention Scores from the Color-Word Interference Subtest

	Baseline Score	Post-Intervention Score
Color Naming		
Completion Time SS	13	13
Total Errors CPR	100	100
Word Reading		
Completion Time SS	11	10
Total Errors CPR	100	20
Inhibition		
Completion Time SS	13	12
Corrected Errors CPR	100	20
Uncorrected Errors CPR	100	100
Total Errors SS	13	9
Inhibition/Switching		
Completion Time SS	10	12
Corrected Errors CPR	10	100
Uncorrected Errors CPR	61	100
Total Errors SS	8	13

Note. SS = Scaled Score; CPR = Cumulative Percentile Rank; IN = Inhibition; CN = Color Naming; SW = Inhibition/Switching.

Teacher Survey.

Over the course of the intervention period, the frequency of Nick engaging in physical aggression declined significantly. At baseline he was often observed throwing objects or destroying school property, and at times he was observed hitting, kicking, or punching others. By the post-intervention rating, Nick was not displaying either of these behaviors in school. Nick's teacher did not observe a positive change in his verbal aggression, but rather observed an increase in the frequency with which he yelled at others. A slight increase in physical over-activity was observed as well; this is in addition to relatively no change in verbal interruptions in the classroom setting. Table 8

includes the results from the teacher survey at the baseline, mid-intervention, and post-intervention phases of the study.

Table 8

Teacher Survey of Nick's Behavior in School

	Baseline Rating	Mid- Intervention Rating	Post- Intervention Rating
Verbal Aggression			
Curses at faculty and/or students	S	S	S
Yells/screams at others	O	S	A
Teases or makes rude comments to others	S	S	S
Physical Aggression			
Hits/kicks/punches others	S	N	N
Throws objects or destroys property	O	S	N
Verbal Interruption			
Calls out in class	S	S	N
Interrupts others' conversations/games/activities	N	N	S
Physical Over-activity			
Leaves assigned area	N	S	S
Takes or touches others' possessions	O	O	O
Leaves seat at inappropriate times	S	S	O

Note. N=Never; S=Sometimes; O=Often; A=Almost Always.

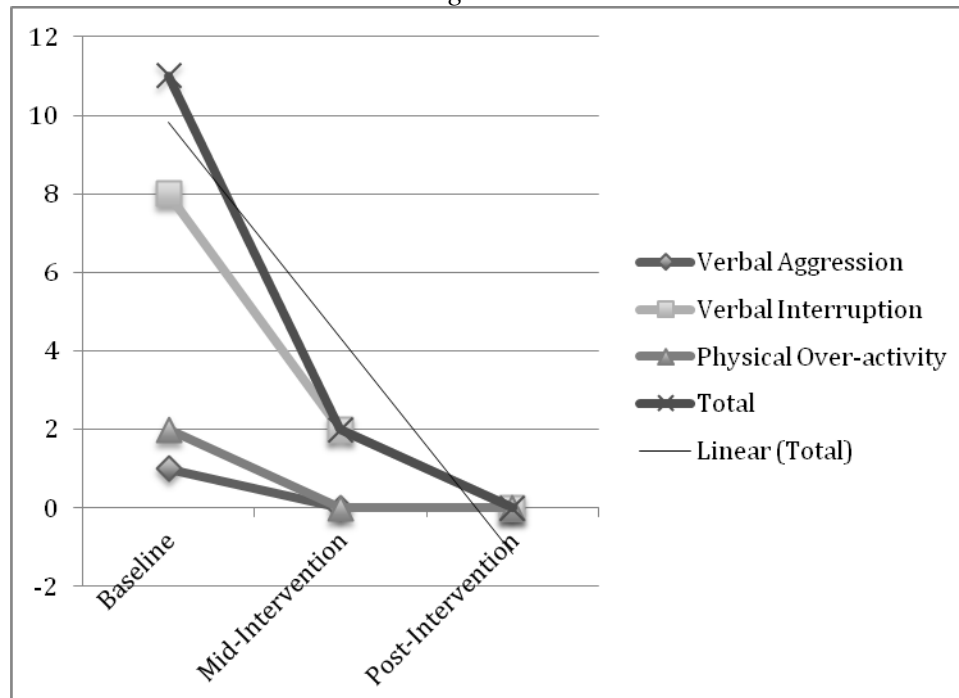
Classroom Observation.

During the 20-minute observation at baseline, Nick engaged in a total of 11 impulsive behaviors, eight of which were verbal interruptions. He was primarily observed talking in class at inappropriate times, and was also observed calling out in class without raising his hand. Nick was observed teasing another peer, and fidgeting

with objects on his desk. During the mid-intervention observation, Nick engaged in only two acts of verbal interruption, and did not engage in any acts of verbal aggression or physical over-activity. By the post-intervention observation, Nick did not engage in any impulsive behaviors. Figure 3 includes the results from the classroom observation at the baseline, mid-intervention, and post-intervention phases of the study.

Figure 3

Nick's Classroom Behavior During 20-minute Observations



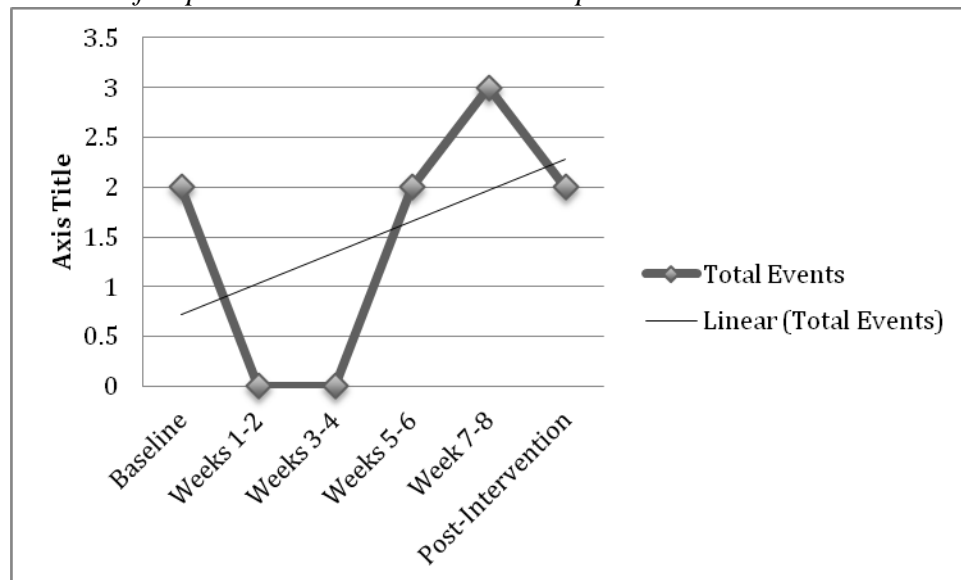
Discipline Record.

Nick's inappropriate behavior did not fluctuate between baseline and post-intervention periods; he earned only two discipline referrals during each of those phases; however, his behavior fluctuated significantly during the intervention period. Although he did not earn any discipline referrals for the first four weeks of the intervention, he

earned a total of five referrals during the final four weeks of the intervention. Therefore, the trend in Nick's behavioral data indicates a significant increase in inappropriate school behavior over the course of the intervention. Figure 4 depicts the number of impulsive events on Chris's discipline record segmented in two-week intervals.

Figure 4

Number of Impulsive Events on Nick's Discipline Record



Anthony's Results.

AARS Subtest.

Anthony's performance was comparable with others his age on a task measuring his ability to inhibit physical responses to auditory information. While completing the auditory attention task, Anthony made one omission error during both the baseline and post-intervention administrations. Interestingly, he failed to respond to the exact same target word during both of these trials. This error pattern was not found in most of the students in the normative sample, and as a result, his scores for total correct and omission

errors decreased to the borderline range. Table 9 includes Anthony’s results from the AARS subtest at baseline and post-intervention.

Table 9

Anthony’s Baseline and Post-Intervention Scores from the AARS

	Baseline %ile	Post-Intervention %ile
Auditory Attention		
Total Correct	11-25	11-25
Omission Errors	11-25	11-25
Commission Errors	26-50	26-50
Inhibitory Errors	26-50	26-50
Response Set		
Total Correct	26-50	26-50
Omission Errors	26-50	26-50
Commission Errors	26-50	26-50
Inhibitory Errors	26-50	26-50
	Baseline SS	Post-Intervention SS
Combined Scores		
Auditory Attention	8	8
Response Set	8	8

Note. AA = Auditory Attention; RS = Response Set; SS = Scaled Score.

Color-Word Interference Subtest.

Anthony presented with rapid naming skills that were significantly below expectation for a student his age. Anthony is a student who has a tendency to stutter, and was previously identified as a student with a speech impairment. Anthony’s performance continued to be slow during the inhibition task and the inhibition/switching tasks of this assessment. Although he did not commit many errors when required to inhibit his verbal responses based on one rule, he struggled to respond correctly when the demands of the task increased to incorporate two sets of rules based on visual cues. At the post-intervention assessment, Anthony committed many more errors on the inhibition task,

and committed a similar number of errors on the inhibition/switching task. It was noted across baseline and post-intervention assessments that Anthony possessed skills in self-monitoring his verbal performance. Although he committed many errors, he immediately corrected his errors. It is likely that Anthony’s speed impairment influenced his performance on this task, and also influences his functional communication and verbal inhibition skills in the classroom setting. Table 10 includes Anthony’s results from the Color-Word Interference subtest at baseline and post-intervention.

Table 10

Anthony’s Baseline and Post-Intervention Scores from the Color-Word Interference Subtest

	Baseline Score	Post-Intervention Score
Color Naming		
Completion Time SS	3	4
Total Errors CPR	35	100
Word Reading		
Completion Time SS	5	3
Total Errors CPR	100	100
Inhibition		
Completion Time SS	7	1
Corrected Errors CPR	100	1
Uncorrected Errors CPR	100	100
Total Errors SS	13	5
Inhibition/Switching		
Completion Time SS	6	9
Corrected Errors CPR	8	8
Uncorrected Errors CPR	100	100
Total Errors SS	9	9

Note. SS = Scaled Score; CPR = Cumulative Percentile Rank; IN = Inhibition; CN = Color Naming; SW = Inhibition/Switching.

Teacher Survey.

In general, Anthony's teacher did not see any significant changes in his behavior across the four domains included on the teacher survey. At baseline, Anthony's teacher reported significantly high occurrences of verbal aggression and verbal interruption. He also frequently took items that did not belong to him, and at times engaged in physical aggression. At the post-intervention rating, Anthony demonstrated a slight decline in the frequency of verbal aggression in school; however, he continued to engage in all other behaviors at a relatively similar frequency to the baseline period. Table 11 includes the results from the teacher survey at the baseline, mid-intervention, and post-intervention phases of the study.

Table 11

Teacher Survey of Anthony's Behavior in School

	Baseline Rating	Mid- Intervention Rating	Post- Intervention Rating
Verbal Aggression			
Curses at faculty and/or students	O	A	O
Yells/screams at others	A	O	O
Teases or makes rude comments to others	O	O	S
Physical Aggression			
Hits/kicks/punches others	S	S	S
Throws objects or destroys property	S	S	O
Verbal Interruption			
Calls out in class	O	A	O
Interrupts others' conversations/games/activities	A	A	O
Physical Over-activity			
Leaves assigned area	S	S	S
Takes or touches others' possessions	A	S	O
Leaves seat at inappropriate times	S	O	S

Note. N=Never; S=Sometimes; O=Often; A=Almost Always.

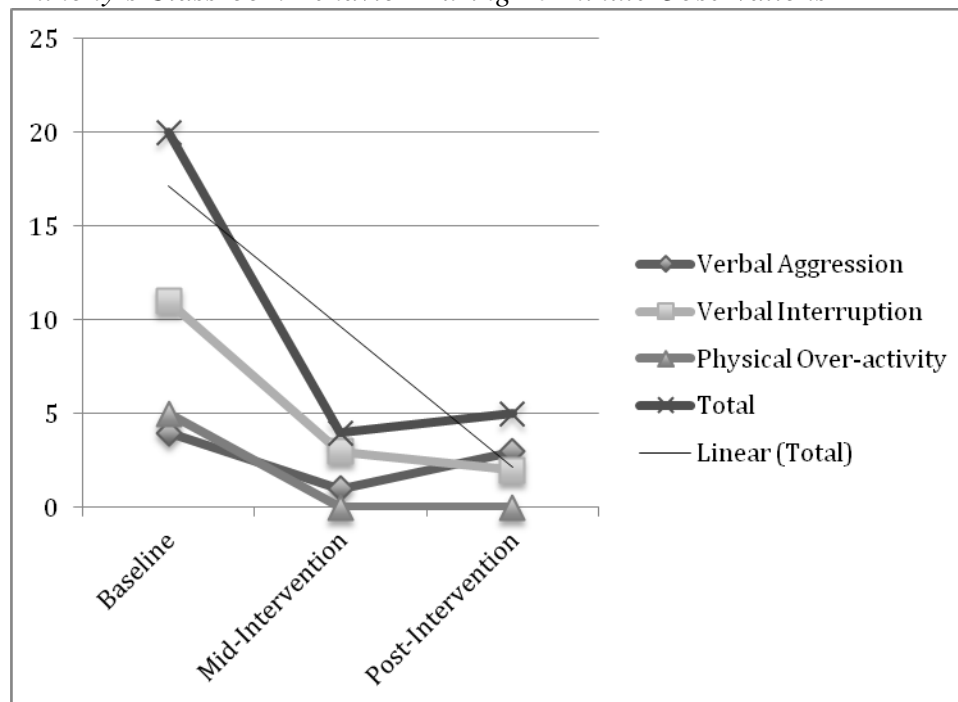
Classroom Observation.

Anthony demonstrated a significant change in his behavior during the classroom observations from baseline to post-intervention. At baseline, Anthony engaged in a total of 20 impulsive acts, including 11 verbal interruptions, four incidents of verbal aggression, and five observations of physical over-activity. Anthony primarily called out in class without raising his hand, and also made rude comments toward others. He took other people's belongings on two occasions, and also fidgeted with objects on his desk. By the mid-intervention observation, Anthony's total observed impulsive behaviors

declined to four, which included calling out in class, teasing another student, and talking in class. At the post-intervention observation, Anthony engaged in five impulsive behaviors, including cursing and calling out in class. Overall, a significant decline in his impulsive behavior in the classroom setting was observed. Figure 5 includes the results from the classroom observation at the baseline, mid-intervention, and post-intervention phases of the study.

Figure 5

Anthony's Classroom Behavior During 20-minute Observations

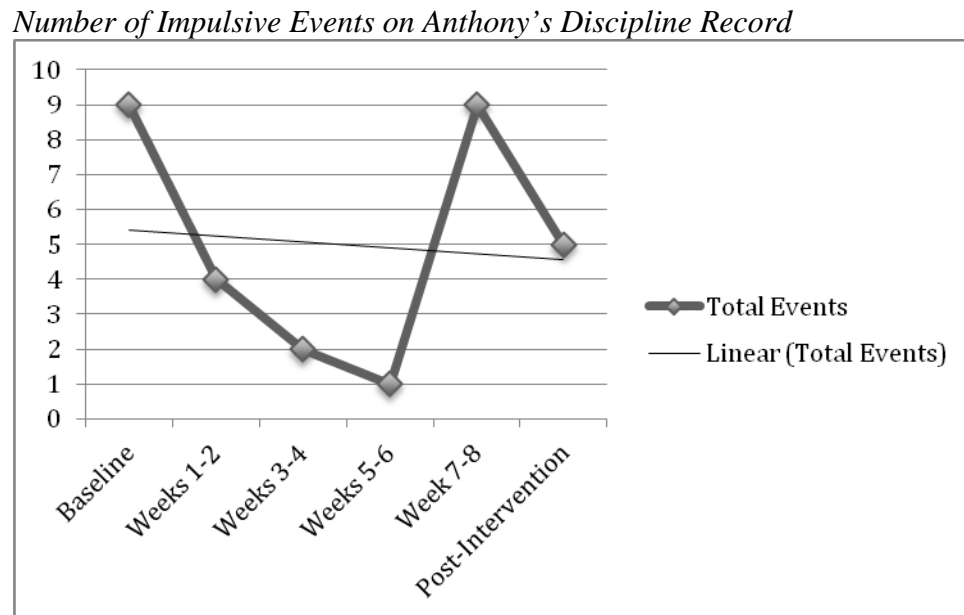


Discipline Record.

During the two-week baseline period, Anthony accumulated nine discipline referrals. His inappropriate school behavior significantly declined during the first six weeks of the intervention; however, during the final two weeks of the intervention,

Anthony again accrued nine discipline referrals. Anthony's inappropriate behavior again declined during the two weeks post-intervention. Overall, the trend in Anthony's behavioral data suggests a slight decline in inappropriate school behavior during the course of the study. Figure 6 depicts the number of impulsive events on Anthony's discipline record segmented into two-week intervals.

Figure 6



Rebecca's Results.

AARS Subtest.

Rebecca demonstrated skills in inhibiting physical responses to auditory information that were comparable with same-age peers at baseline and post-intervention. No deficits were found in this domain. Table 12 includes Rebecca's results from the AARS subtest at baseline and post-intervention.

Table 12

Rebecca’s Baseline and Post-Intervention Scores from the AARS

	Baseline %ile	Post-Intervention %ile
Auditory Attention		
Total Correct	51-75	51-75
Omission Errors	51-75	51-75
Commission Errors	26-50	26-50
Inhibitory Errors	26-50	26-50
Response Set		
Total Correct	51-75	51-75
Omission Errors	51-75	51-75
Commission Errors	>75	>75
Inhibitory Errors	>75	>75
	Baseline SS	Post-Intervention SS
Combined Scores		
Auditory Attention	12	12
Response Set	12	12

Note. AA = Auditory Attention; RS = Response Set; SS = Scaled Score.

Color-Word Interference Subtest.

Rebecca presented with rapid naming skills that were comparable with her same age peers across administrations. At baseline, Rebecca demonstrated a normative deficit in verbal response inhibition. She exhibited this deficit on a simple task, and also complex task that incorporated a cognitive shifting demand along with the requirement to inhibit over-learned automatic responses.

After the intervention period, Rebecca demonstrated improvement of more than one standard deviation on the frequency of errors she committed during the verbal inhibition task. Although she performed the task at the same rate, the accuracy of her performance significantly improved. Table 13 includes Rebecca’s results from the Color-Word Interference subtest at baseline and post-intervention.

Table 13

Rebecca's Baseline and Post-Intervention Scores from the Color-Word Interference Subtest

	Baseline Score	Post-Intervention Score
Color Naming		
Completion Time SS	9	8
Total Errors CPR	100	40
Word Reading		
Completion Time SS	9	9
Total Errors CPR	100	100
Inhibition		
Completion Time SS	7	8
Corrected Errors CPR	5	20
Uncorrected Errors CPR	6	100
Total Errors SS	1	9
Inhibition/Switching		
Completion Time SS	9	8
Corrected Errors CPR	2	9
Uncorrected Errors CPR	17	55
Total Errors SS	3	8

Note. SS = Scaled Score; CPR = Cumulative Percentile Rank; IN = Inhibition; CN = Color Naming; SW = Inhibition/Switching.

Teacher Survey.

Rebecca's teacher did not report significantly high ratings of impulsive behavior across the four domains at baseline, with the exception of often leaving her assigned area. Although it was observed only occasionally, Rebecca would engage in acts of physical aggression in school. By the post-intervention rating, Rebecca was no longer exhibiting physically aggressive acts in school. Rebecca's teacher also indicated a decline in her leaving her assigned area by the end of the intervention period. Table 14 includes the results from the teacher survey at the baseline, mid-intervention, and post-intervention phases of the study.

Table 14

Teacher Survey of Rebecca’s Behavior in School

	Baseline Rating	Mid-Intervention Rating	Post-Intervention Rating
Verbal Aggression			
Curses at faculty and/or students	S	S	S
Yells/screams at others	S	S	S
Teases or makes rude comments to others	S	S	S
Physical Aggression			
Hits/kicks/punches others	S	S	N
Throws objects or destroys property	S	S	N
Verbal Interruption			
Calls out in class	N	N	N
Interrupts others’ conversations/games/activities	S	S	N
Physical Over-activity			
Leaves assigned area	O	O	S
Takes or touches others’ possessions	N	N	N
Leaves seat at inappropriate times	N	S	S

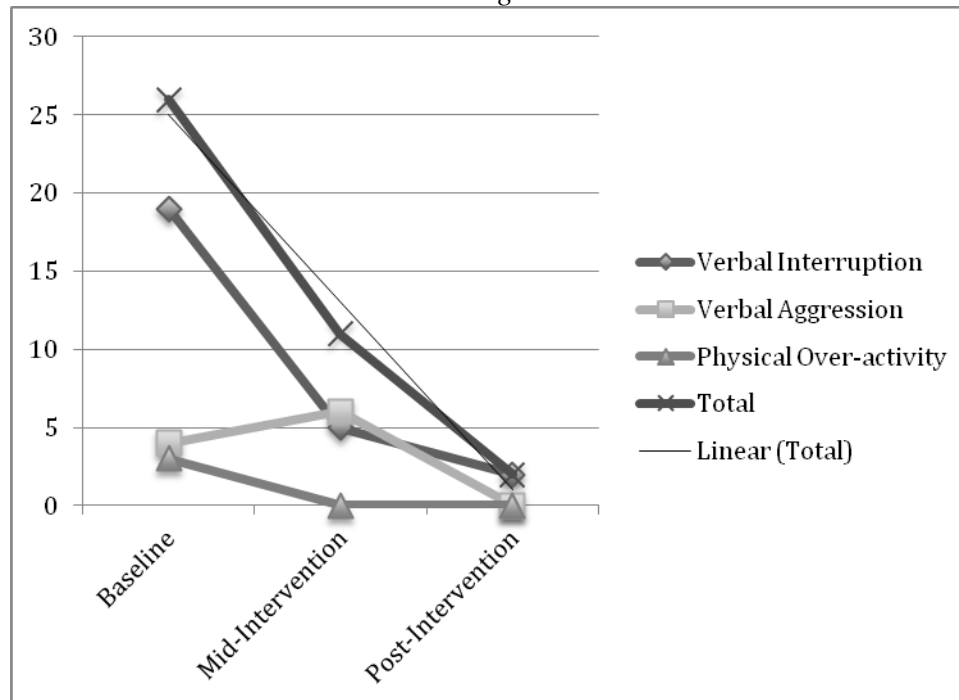
Note. N=Never; S=Sometimes; O=Often; A=Almost Always.

Classroom Observation.

During the baseline observation, Rebecca engaged in a total of 26 impulsive behaviors. Of those 26 events, 19 were verbal interruptions. Rebecca called out in class 14 times, and talked to peers during class on five occasions. Rebecca also made a rude remark about another student, and poked a student repeatedly during this observation. During the mid-intervention observation, the frequency of verbal interruptions declined significantly, as did physical over-activity. She engaged in a slightly greater number of acts of verbal aggression, which included cursing, teasing, and making verbal threats. By

the post-intervention observation, Rebecca engaged in only two impulsive acts. Rebecca talked in class twice during this observation. Overall, a significant decline in her impulsive behavior in the classroom setting was observed. Figure 7 includes the results from the classroom observation at the baseline, mid-intervention, and post-intervention phases of the study.

Figure 7

Rebecca's Classroom Behavior During 20-minute Observations

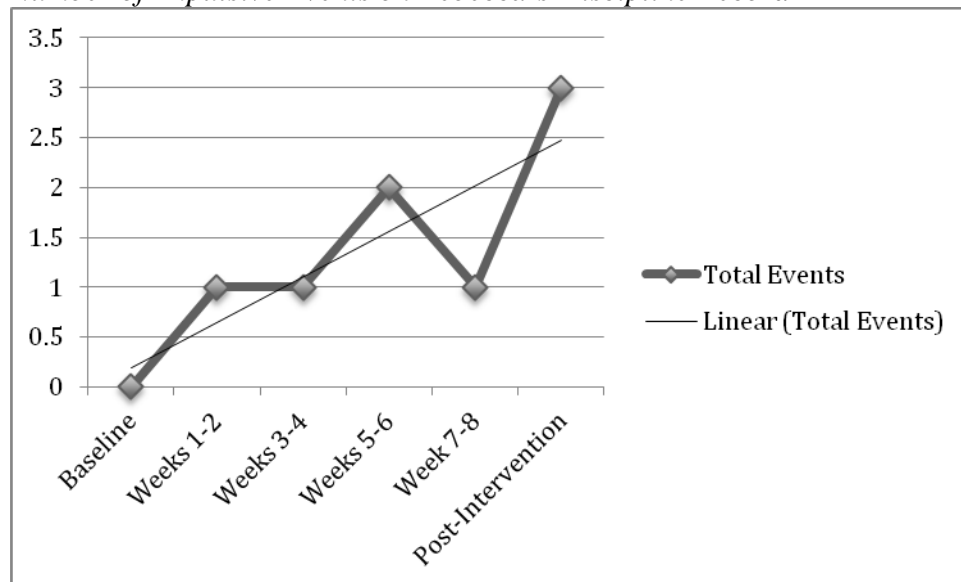
Discipline Record.

Rebecca demonstrated an overall increase in inappropriate behavior at school over the course of the eight-week intervention. During the two-week baseline period, Rebecca did not engage in any inappropriate behavior in school. She accrued two discipline referrals during the first four weeks of the intervention, and then three referrals during the

final four weeks of the intervention. During the post-intervention period, Rebecca’s behavior resulted in three discipline referrals. Figure 8 depicts the number of impulsive events on Rebecca’s discipline record, segmented in two-week intervals.

Figure 8

Number of Impulsive Events on Rebecca’s Discipline Record



Tonya’s Results.

AARS Subtest.

Tonya demonstrated inhibition of physical responses that were comparable with same-age peers at baseline and post-intervention. No deficits were found in this domain.

Table 15 includes Tonya’s results from the AARS subtest at baseline and post-intervention.

Table 15

Tonya's Baseline and Post-Intervention Scores from the AARS

	Baseline %ile	Post-Intervention %ile
Auditory Attention		
Total Correct	51-75	51-75
Omission Errors	51-75	51-75
Commission Errors	26-50	26-50
Inhibitory Errors	26-50	26-50
Response Set		
Total Correct	51-75	>75
Omission Errors	51-75	>75
Commission Errors	>75	>75
Inhibitory Errors	>75	>75
	Baseline SS	Post-Intervention SS
Combined Scores		
Auditory Attention	12	12
Response Set	12	14

Note. AA = Auditory Attention; RS = Response Set; SS = Scaled Score.

Color-Word Interference Subtest.

Tonya presented with rapid naming skills that were comparable with same-age peers across administrations. A baseline, Tonya demonstrated a significant normative deficit in her capacity to inhibit verbal responses. Although her performance improved slightly when she was required to shift between sets of rules, her scores continued to be below the expected range. Tonya demonstrated an improvement of one standard deviation in her scores measuring her ability to inhibit automatic verbal responses to visual information across baseline and post-intervention assessments. She continued to commit a greater number of uncorrected errors than her same-age peers, indicating a lack of self-monitoring; however, her overall response inhibition improved. Table 16 includes Tonya's results from the Color-Word Interference subtest at baseline and post-intervention.

Table 16

Tonya's Baseline and Post-Intervention Scores from the Color-Word Interference Subtest

	Baseline Score	Post-Intervention Score
Color Naming		
Completion Time SS	8	10
Total Errors CPR	40	100
Word Reading		
Completion Time SS	11	10
Total Errors CPR	25	100
Inhibition		
Completion Time SS	7	9
Corrected Errors CPR	10	55
Uncorrected Errors CPR	25	12
Total Errors SS	5	8
Inhibition/Switching		
Completion Time SS	7	8
Corrected Errors CPR	20	35
Uncorrected Errors CPR	28	38
Total Errors SS	7	9

Note. SS = Scaled Score; CPR = Cumulative Percentile Rank; IN = Inhibition; CN = Color Naming; SW = Inhibition/Switching.

Teacher Survey.

At baseline, Tonya's teacher reported frequent observations of verbal interruption and verbal aggression in school. She also often left her assigned area, and at times, engaged in physical aggression. Throughout the intervention and post-intervention periods, Tonya's teacher did not report a decline in the frequency of her verbal aggression, verbal interruption or physical aggression in school. A slight reduction in the frequency with which she left her assigned area was reported. Table 17 includes the results from the teacher survey at the baseline, mid-intervention, and post-intervention phases of the study.

Table 17

Teacher Survey of Tonya's Behavior in School

	Baseline Rating	Mid- Intervention Rating	Post- Intervention Rating
Verbal Aggression			
Curses at faculty and/or students	O	A	O
Yells/screams at others	A	A	A
Teases or makes rude comments to others	S	A	S
Physical Aggression			
Hits/kicks/punches others	S	S	S
Throws objects or destroys property	S	S	O
Verbal Interruption			
Calls out in class	O	O	O
Interrupts others' conversations/games/activities	O	O	O
Physical Over-activity			
Leaves assigned area	O	O	S
Takes or touches others' possessions	S	S	S
Leaves seat at inappropriate times	S	O	S

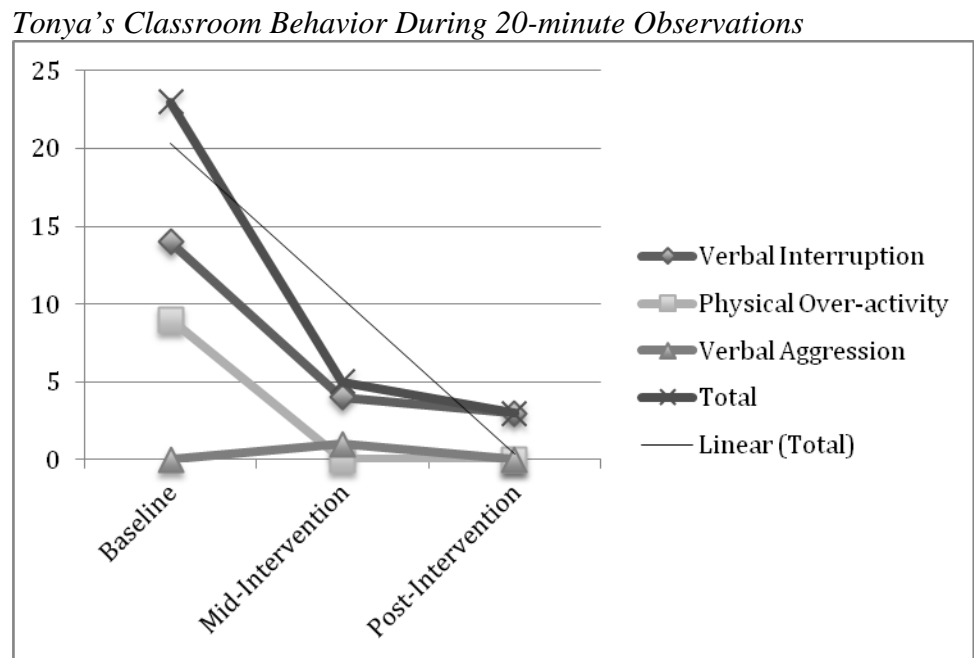
Note. N=Never; S=Sometimes; O=Often; A=Almost Always.

Classroom Observation.

During the baseline observation, Tonya was observed engaging in 23 impulsive acts. The majority of these acts were verbal interruptions including calling out in class, interrupting others' conversations and talking in class. The remaining impulsive acts included fidgeting with objects on her desk, and leaving her seat without permission. Tonya's behavior significantly changed at the mid-intervention observation; she engaged in only five impulsive behaviors. All of these incidents were verbal in nature. By the post-intervention observation, Tonya displayed only three incidents of verbal

interruption. Overall, a significant decline in her impulsive behavior in the classroom setting was observed. Figure 9 includes the results from the classroom observation at the baseline, mid-intervention, and post-intervention phases of the study.

Figure 9

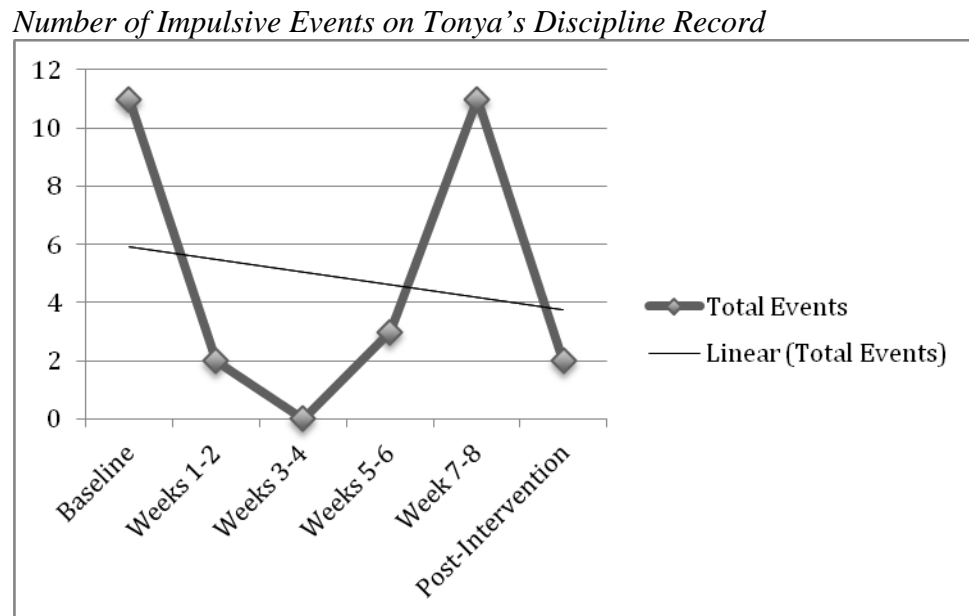


Discipline Record.

The data representing Tonya's discipline records demonstrated an overall decline in inappropriate behavior from baseline to post-intervention. After receiving 11 discipline referrals during the two-weeks prior to the intervention, Tonya's behavior warranted only two discipline referrals in the first four weeks. During weeks five and six, she received three referrals, and then again received 11 referrals for inappropriate behavior during the final two weeks of the intervention. Her behavior improved during the post-intervention period; Tonya earned only two discipline referrals during that time.

Figure 10 depicts the number of impulsive events on Rebecca’s discipline record, segmented in two-week intervals.

Figure 10



Chapter 5: Discussion

Summary of the Findings

This study investigated the impact of an eight-week school-based GCBT intervention on cognitive inhibition and behavioral impulsivity in adolescent participants. The intention of the study was to evaluate the trend in inhibition and impulsivity from baseline to post-intervention assessments across five middle school students, dually enrolled in a residential treatment facility and a center-based, emotional support program. The following is a review of the trends in data for each of the five participants.

Chris. Chris presented with inhibition of physical responses to auditory stimuli at baseline on the cognitive assessments; however, he demonstrated a deficit in his ability to inhibit verbal responses to visual cues. His teacher reported a high frequency of verbal interruptions and verbal aggression in class as well. After the intervention period, Chris continued to present with difficulty inhibiting his verbal responses to visual information on the cognitive assessment; however, his teacher reported a decline in the frequency of his verbal interruptions in the classroom setting. Chris continued to present with impulsive, verbally aggressive acts in the school setting, and his discipline records indicated an overall increase in inappropriate behavior from baseline to post-intervention assessment.

Thus, although the intervention did not influence Chris's performance on a cognitive assessment of verbal inhibition, it appears that Chris may have gained skills in inhibiting verbal responses during the intervention period, which he was then able to generalize into the classroom setting when he was not in a heightened state of emotional arousal. When emotionally charged, Chris continued to present with impulsive and

aggressive verbalizations. Chris's performance across cognitive and behavioral assessments also suggests a deficit in self-monitoring. In addition to this intervention that specifically targets impulse control, Chris would also have benefitted from learning to monitor and modulate his behavior when emotionally charged in order to meet the social expectations of his environment when interacting with others and when completing academic tasks.

Nick. Nick presented with adequate inhibitory capacity when required to inhibit verbal responses; however, he presented with a significant deficit in inhibiting physical responses to auditory cues. Interestingly, when Nick's behavioral data were examined, all of his discipline referrals resulted from engaging in physically aggressive or physically over-active behavior. Although the trend of his discipline referrals increased over the course of the study, his teacher's perception of his behavior at post-intervention indicated a reduction of physically aggressive acts in the classroom setting. Nick also earned a score that was one standard deviation above the score that he earned at baseline on the measure of physical inhibition to visual cues during the post-intervention assessment. Thus, after participating in the eight-week intervention, Nick's ability to inhibit physical responses to auditory cues improved, and the frequency with which he engaged in physically aggressive acts in the classroom setting declined.

Anthony. Anthony presented with the capacity to inhibit physical responses to auditory cues at baseline; however, he presented with variability across his performance on the task measuring inhibition of verbal responses to visual cues. Anthony's tendency to stutter impacted the speed at which he performed the rapid naming tasks associated with the measure of verbal inhibition. Anthony inconsistently inhibited his verbal

responses to visual cues across administrations, but did present with strength in self-monitoring his verbal responses because he was observed correcting his errors during the task. Thus, the intervention did not appear to make an impact on Anthony's performance on a cognitive measure of verbal inhibition.

Anthony's discipline records reveal a high frequency of leaving his assigned area and cursing when angry. These behaviors did not decline during or after the intervention. Anthony's speech impairment is likely a contributing factor to his behavioral problems in the school setting. Anthony has a history of being bullied in school because of his stutter, and he was also a witness to multiple, traumatically violent events unrelated to his speech impairment during his childhood. These experiences have resulted in Anthony's perceiving non-threatening or mildly confrontational environments, interpersonal interactions, and situations as threatening, and as a result, he responds impulsively with defensive behavior that appears aggressive and adversarial. Therefore, it is likely that Anthony needs further intervention to address the emotional factors that are contributing to his impulsive behavior; he also needs language therapy to assist in reducing the frequency of his stutter, in order to observe a difference outside of the therapeutic setting.

Rebecca. Rebecca presented with adequate inhibitory capacity when required to respond physically to auditory cues; however, she presented with a significant deficit in inhibiting verbal responses to visual cues. Interestingly, when Rebecca's behavioral data were examined, her discipline referrals were primarily for verbally aggressive acts or verbal interruptions. Classroom observations at baseline also indicated a high frequency of verbal aggression and verbal interruptions. When the post-intervention data were examined, Rebecca earned a score that was more than one standard deviation above her

initial score on the baseline assessment of verbal inhibition. Although classroom observation data and teacher perception showed a decrease in the frequency of verbal interruptions, physical over activity, and physical aggression in the classroom setting, her overall school discipline referrals demonstrated a trend toward increased violations.

Thus, after participating in the eight-week intervention, Rebecca demonstrated an improvement in her performance on a cognitive measure of verbal inhibition and a reduction in the frequency of impulsive acts in the classroom setting; however, her behavior as a whole in the school setting as measured by her discipline record, was not significantly impacted.

Tonya. Tonya presented with adequate inhibitory capacity when required to respond physically to auditory cues; however, she presented with a significant deficit in inhibiting verbal responses to visual cues. Tonya presented with both verbally and physically impulsive behavior in the school setting as indicated across teacher report, discipline records, and classroom observation. The teacher report, however, did indicate a particularly high frequency of verbal interruption and verbal aggression at baseline.

When the post-intervention data were examined, Tonya earned a score that was one standard deviation above her baseline score on a measure of verbal inhibition. Her discipline record indicated a reduction in the frequency both of verbally and of physically impulsive acts at post-intervention, compared with her functioning at baseline. Her teacher's perception of Tonya's behavior in the classroom did not change; however, her impulsive behavior during the classroom observations declined.

Thus, after the eight-week intervention, Tonya demonstrated an improved capacity to inhibit verbal responses on a cognitive measure, and demonstrated a reduction in verbally and physically impulsive incidents on her discipline record.

Overall trends in the data. When the assessment results for all five students were aggregated, three students' cognitive scores improved more than or equal to one standard deviation from the baseline score; three students' impulsive behaviors in the classroom declined based on teacher report, and one student's overall discipline record showed a decrease in impulsive behavior. Only one student did not present with a change in cognitive or in behavioral data. Of the three students whose cognitive scores changed, two presented with decreases in impulsive behavior in the classroom and one presented with an overall reduction in discipline referrals. Thus, all of the students who obtained changes in cognitive scores also demonstrated changes in their behavior.

Additionally, an association between the cognitive area of deficit and the type of impulsive behavior was observed. The students in the study presented at baseline with a cognitive deficit either in verbal inhibition or in physical inhibition, but not in both. Four of the five students presented with verbal inhibition deficits and one student presented with a physical inhibition deficit. The one student with a deficit in physical inhibition presented with acts of physical aggression and physical over-activity in the school setting, and the four students who presented with a deficit in verbal inhibition demonstrated acts of verbal aggression and verbal interruptions in the school setting.

Impact of the Findings

Although conclusive statements regarding the effects of the intervention program on the adolescent participants were unable to be made due to the small sample size and

absence of control group, trends in the data suggest that the intervention had a positive impact on the behavior of four of the five student participants. The findings of this study support previous research suggesting that school-based CBT programs have positive effects on students with externalizing disorders, and are an important component of the overall positive behavior support program of the school.

Additionally, the current study followed the lead of previous intervention research that grouped students based on the presence of a behavioral trait rather than on a diagnosis or educational classification. Providing the intervention based on behavioral indicators rather than on diagnosis also lends itself to providing preventative intervention to regular education students within a response to intervention framework, rather than waiting for a clinical diagnosis or educational classification to be made. The promising effects of this intervention with students presenting with clinically significant levels of impulsive behavior suggest the potential for promising outcomes when implementing this program with students at-risk for increasingly frequent and severe impulsive behavior.

The findings of this study also provided more information regarding the changes that should be made to the intervention prior to conducting additional research on this program. Although impulsive behavior decreased, the participants continued to present with physically and verbally aggressive behavior in school. When emotionally charged, the students struggled to implement the self-regulatory strategies learned in the group intervention. Enhancing the intervention to include psychoeducational modules for labeling and modulating emotions is necessary. In recent years, the research on Dialectical Behavior Therapy (DBT) has shown positive outcomes with adolescent populations (Groves, Backer, Bosch, & Miller, 2012; Neece Berk, & Combs-Ronto,

2013). DBT is based largely on cognitive-behavioral principals with the additional focus of incorporating acceptance strategies utilized to make the client to feel better understood (Gerardi & Terjesen, 2014). Therefore, the treatment is unique in balancing change with acceptance (Linehan, 1993). The emphasis of DBT with adolescents is to improve their abilities to regulate their emotions (Neece et al., 2013).

There are four skill domains incorporated into therapy with individuals using the DBT framework including mindfulness skills, interpersonal effectiveness skills, distress tolerance skills, and emotion regulation skills (Linehan, 1993). Mindfulness skills assist adolescents in directing their attention to their emotions without assigning judgment of the emotions or reacting impulsively to their emotions (Linehan, 1993). Interpersonal effectiveness skills teach adolescents to communicate needs effectively and cope with interpersonal problems; an absence of these skills can lead to strong negative emotions (Linehan, 1993). Distress tolerance skills, including distraction and self-soothing techniques, are taught to assist adolescents in coping with intense negative emotions (Linehan, 1993). The emotion regulation module teaches students to decrease vulnerabilities; these include attending to their health and sleep routines, and increasing behaviors that will result in positive affect, such as scheduling pleasant activities, and decrease negative affect, such as facing a fear that causes anxiety (Linehan, 1993). Miller et al. (2007) introduced a fifth component during their work with self-injurious and suicidal adolescents; it is entitled the Middle Path module. The Middle Path module involves parents and caregivers into the therapeutic process by instructing students to understand the perspective of others and find the middle ground during disagreements,

while receiving validation of their emotions and behaviors from parents and caregivers (Miller et al., 2007).

Incorporating DBT modules into the existing program will provide the emphasis on emotion regulation that was addressed during the intervention; however, it evidently was not enough to have an impact. Future research should investigate whether or not the inclusion of the DBT modules into the existing program decreases the frequency of emotionally charged impulsive acts in student participants.

Another component that should be added to the intervention is a module for training teachers regarding the principals of CBT and DBT, strategies to support generalization of skills in the classroom, and approaches to student feedback on behavior. Furthermore, including time at the beginning of each group session to meet briefly with each participant to review his or her behavior in between groups is an important reflective exercise that should be added to the structure of each session. Incorporating these elements would likely enhance the effects of the intervention in the short term, and may allow for generalization and long-term outcomes.

Limitations

There were multiple limitations to this study. First, the limited number of participants and absence of control group limited the analysis of the data to a single-subject design. As a result, this current paper was limited in terms of a discussion regarding the significance of the improved behavior changes observed in four of the five participants; the significance, therefore, was inaccessible. Second, the students who participated in this intervention were displaying such a significant frequency and severity of disruptive behavior that they were concurrently enrolled in a residential treatment

facility. Thus, although the findings could be extrapolated to others being treated in a residential facility, the results are not generalizable to students enrolled in their neighborhood public schools. It could be expected that the impact on students with a lesser severity of disruptive behavior would be greater, but that cannot be confirmed without further investigation.

Another limitation of the study revolved around the concurrent treatments that the participants were receiving. In addition to the present intervention, the students were also receiving social skills training in the school, were being supported by a school-wide positive behavioral support program, and were receiving medication management, individual therapy, and group therapy at the residential facility. The presence of the additional interventions makes it difficult to discern the effectiveness of the current intervention from the effects of the other interventions.

Last, the classroom observation data were likely skewed due to the fact that the observer also facilitated the group intervention, and met with each student individually to administer the cognitive assessments. As a result, the presence of this observer was a cue in the environment to utilize the strategies learned during the group intervention. The observational data demonstrated a significant decline in impulsive behavior across all five participants. This data do not reflect the generalization of learned inhibitory skills into the classroom setting, but rather support for the application of learned skills in the classroom setting when provided an environmental cue. Providing the environmental cue is another step closer to generalization of skills learned during the group intervention, and although the cue interfered with the data collection, the presence of the observer added support for training teachers to provide the environmental cue in the classroom.

Future Directions

The findings of this study support the need to examine the effects of this intervention further. Future research should include an investigation of this intervention with the modifications of adding DBT and teacher training modules with a larger sample size that includes a control group. Additionally, the effects of the intervention with students who are displaying at-risk levels of impulsive behavior in the regular education setting, as well as a higher frequency of impulsive behavior and who are receiving special education in their neighborhood schools should be investigated. The effects of this intervention should be examined with students who are not concurrently receiving mental health treatment outside of the school setting; medication should also be taken into account with further investigations.

References

- Abikoff, H. (1985). Efficacy of cognitive training interventions in hyperactive children: A critical review. *Clinical Psychology Review*, 5, 479-512.
- Abikoff, H. (1991). Cognitive training in ADHD children: less to it than meets the eye. *Journal of Learning Disabilities*, 24, 4, 205-209.
- Abikoff, H., Hechtman, L., Klein, R.G., Gallagher, R., Fleiss, K., Etcovitch, J., ...Pllack, S. (2004). Special section: methylphenidate and multimodal psychosocial treatment in ADHD: social functioning in children with ADHD treated with long-term methylphenidate multimodal psychosocial treatment. *Journal of the American Academy of Child & Adolescent Psychiatry*, 43, 7, 820-829. Doi: 10.1097/01.chi.0000128797.91601.1a
- Best, J. R., Miller, P.H., & Jones, L.L. (2009). Executive functions after age 5: Changes and correlates. *Developmental Review*, 29, 180-200. doi:10.1016/j.dr.2009.05.002
- Bloomquist, M.L., August, G.J., & Ostrander, R. (1991). Effects of a school-based cognitive-behavioral intervention for ADHD children. *Journal of Abnormal Child Psychology*, 19, 5, 591-605.
- Bronfenbrenner, U. (1994). Ecological models of human development. In *International Encyclopedia of Education, Vol. 3, 2nd Ed.* Oxford: Elsevier. Reprinted in: Gauvain, M. & Cole, M. (Eds.), *Readings on the development of children, 2nd Ed.* (1993, pp. 37-43). NY: Freeman.
- Christner, R.W., Forrest, E., Morley, J., & Weinstein, E. (2007). Taking cognitive-behavior therapy to school: A school-based mental health approach. *Journal of Contemporary Psychotherapy*, 37, 175-183. doi: 10.1007/s10879-007-9052-2

- Christner, R.W., Kamon, E.E., & Mennuti, R.B. (2012). Implementation of cognitive-behavioral therapy (CBT) to school-based mental health. In Mennuti, R.B., Christner, R.W., & Freeman, A. (Eds.), *Cognitive-behavioral interventions in educational settings* (2nd ed.) (pp. 25-52). New York, NY: Routledge.
- Chronis, A.M., Jones, H.A., & Raggi, V.L. (2006). Evidence-based psychosocial treatments for children and adolescents with attention-deficit/hyperactivity disorder. *Clinical Psychology Review, 26*, 486-502. doi: 10.1016/j.cpr.2006.01.002
- Crisp, H.L., Gudmundsen, G.R., & Shirk, S.R. (2006). Transporting evidence-based therapy for adolescent depression to the school setting. *Education and Treatment of Children, 29*, 2, 287-309.
- Delis, D.C., Kaplan, E., & Kramer, J.H. (2001). *Delis Kaplan Executive Function System: Examiner's manual*. San Antonio, TX: Psychological Corporation.
- Gerardi, N. & Terjesen, M.D. (2014). Dialectical behavior therapy and school psychology: training and practices. *The School Psychologist Newsletter, 68*, 3, 1-4.
- Groves, S., Backer, H.S., Bosch, W., & Miller, A. (2012). Review: dialectical behaviour therapy with adolescents. *Child and Adolescent Mental Health, 17*, 2, 65-75. doi: 10.1111/j.1475-3588.2011.00611.x
- Hale, J.B., Reddy, L.A., Semrud-Clikeman, M., Hain, L.A., Whitaker, J., Morley, J., Lawrence, K., Smith, A., & Jones, N. (2011). Executive impairment determines ADHD medication response: implications for academic achievement. *Journal of Learning Disabilities, 44*, 2, 196-212. doi: 10.1177/0022219410391191

- Kendall, P.C. & Braswell, L. (1993). *Cognitive-Behavioral Therapy for Impulsive Children*. New York, NY: The Guilford Press.
- Kendall, P.C., Reber, M., McLeer, S., Epps, J., & Ronan, K.R. (1990). Cognitive-behavioral treatment of conduct-disordered children. *Cognitive Therapy and Research*, 14, 3, 279-297.
- Kessler, R.C., Berglund, P., Demler, O., Jin, R., Merikandas, K.R., & Walters, E.E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the national comorbidity survey replication. *Archives of General Psychiatry*, 62, 593-768.
- Klontz, B.T., Bivens, A., Michels, S., DeLeon, P.H., & Tom, L. (2015). The mokihana program: the effectiveness of an integrated department of education and department of health school-based behavioral health approach. *Psychological Services*, 12, 2, 101-111. doi: 10.1037/t15079-000
- Korkman, M., Kirk, U. & Kemp, S.L. (2007). *NEPSY-II. Clinical and interpretive manual*. San Antonio, TX: Psychological Corporation.
- Koziol, L.F & Budding, D.E. (2009). *Subcortical structures and cognition*. New York, NY: Springer.
- Linehan, M. M. (1993). *Skills training manual for treating borderline personality disorder*. New York, NY: The Guilford Press.
- Mennuti, R.B. & Christner, R.W. (2012). An introduction to cognitive-behavioral therapy with youth. In Mennuti, R.B., Christner, R.W., & Freeman, A. (Eds.), *Cognitive-behavioral interventions in educational settings* (2nd ed.) (pp. 3-23). New York, NY: Routledge.

- Merikangas, K.R., He, J., Burstein, M., Swendsen, J., Avenevoli, S., Case, B., Georgiades, K., Heaton, L., Swanson, S., & Olfson, M. (2011). Service utilization for lifetime mental disorders in U.S. adolescents: Results of the national comorbidity survey-adolescent supplement, *Journal of the American Academy of Child and Adolescent Psychiatry*, 50, 1, 32-45.
- Moeller, F.G., Barratt, E.S., Dougherty, D.M., Schmitz, J.M., & Swann, A.C. (2001). Psychiatric aspects of impulsivity. *The American Journal of Psychiatry*, 158, 11, 1783-1793.
- Montanez, E., Berger-Jenkins, E., Rodriguez, J., McCord, M., & Meyer, D. (2015). Turn 2 us: outcomes of an urban elementary school-based mental health promotion and prevention program servicing ethnic minority youths. *Children & Schools*, 37, 2, 100-107. Doi: 10.1037/t00540-000
- Muresanu, D.F., Stan, A., & Buzoianu, A. (2012). Neuroplasticity and impulse control disorders. *Journal of the Neurological Sciences*, 316, 15-20. doi: 10.1016/j.jns.2012.01.016
- Neece, C.L., Berk, M.S., & Combs-Ronto, L.A. (2013). Dialectical behavior therapy and suicidal behavior in adolescence: linking developmental theory and practice. *Professional Psychology: Research and Practice*, 44, 4, 257-265. doi: 10.1037/a0033396
- O'Leary-Barratt, M., Topper, L., Al-Khudhairi, N., Pihl, R.O., Castellanos-Ryan, N., Mackie, C.J., & Conrod, P.J. (2013). Two-year impact of personality-targeted, teacher-delivered interventions on youth internalizing and externalizing problems:

a cluster-randomized trial. *Journal of the American Academy of Child & Adolescent Psychiatry*, 52, 9, 911-920.

Paaver, M., Eensoo, D., Kaasik, K., Vaht, M., Maestu, J. Harro, J. (2013). Preventing risky driving: a novel and efficient brief intervention focusing on acknowledgement of personal risk factors. *Accident Analysis & Prevention*, 50, 430-437. doi: 10.1016/j.aap.2012.05.019

Pinel, J.P.J., & Edwards, M. (2008). *The anatomy of the human brain* (2nd ed.). Boston, MA: Pearson.

Robinson, T.R, Smith, S.W., Miller, M.D., Brownell, M.T. (1999). Cognitive behavior modification of hyperactivity-impulsivity and aggression: A meta-analysis of school-based studies. *Journal of Educational Psychology*, 91, 2, 195-203.

Steinberg, L.S. (2007). Risk-taking in adolescence: New perspectives from brain and behavioral science. *Current Directions in Psychological Science*, 16, 55-59.

van der Oord, S., Prins, P.J.M., Ooserlaan, J., & Emmelkamp, P.M.G. (2012). The adolescent outcome of children with attention deficit hyperactivity disorder treatment with methylphenidate or methylphenidate combined with multimodal behavior therapy results of a naturalistic follow-up study. *Clinical Psychology and Psychotherapy*, 19, 270-278. doi: 10.1002/cpp.750

Verdejo-Garcia, A., Bechara, A., Recknor, A., & Perez-Garcia, E. (2007). Negative emotion-driven impulsivity predicts substance dependence problems. *Drug And Alcohol Dependence*, 91, 2, 213-219. doi: 10.1016/j.drugalcdep.2007.05.025

Appendix A

Teacher Survey Form

1. Calls out in class
N S O A
2. Hits/kicks/punches others when angry
N S O A
3. Curses at faculty and/or students
N S O A
4. Leaves assigned area
N S O A
5. Taking or touching others' possessions without permission
N S O A
6. Yells/screams at others when angry
N S O A
7. Teases or makes rude comments to others
N S O A
8. Leaves his/her seat at inappropriate times
N S O A
9. Interrupts others' conversations/games/activities without being invited
N S O A
10. Throws objects or destroys property when angry
N S O A

Appendix B

Classroom Observation Sheet

Student: _____ Date: _____ Rater: _____
 Setting/Activity Type: _____ Start Time: _____ End Time: _____

Verbal/ Nonverbal	Behavior	Frequency	Notes
Verbal	Calls out in class		
	Curses, yells, screams		
	Verbal threats		
	Teases/rude comments		
	Interrupts others conversations		
	Talking in class		
Nonverbal	Hits, kicks, punches, pushes		
	Throws objects		
	Interrupts activities/games		
	Leaves seat without permission		
	Leaves room without permission		
	Takes teachers belongings		
	Takes peers belongings		
	Fidgeting		
Touches others			