An overview and research summary of peer-delivered instruction

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Students with deficits in inhibition are at increased risk of experiencing difficulty with learning, social relationships, and emotion regulation. Deficits in the gating system of the basal ganglia cause disruptions in the process of inhibiting interfering stimuli, and result in students exhibiting disruptive behavior across home and school settings. Interventions targeting impulse control primarily include behavior modification systems, and psychotropic medication. However, few interventions have been developed for the school setting that directly targets deficits in inhibition. The following investigation reviews the current research in the fields of executive functions, inhibitory control, and intervention for impulsive behavior. Additionally, the proposed study intends to fill a void in the intervention research for a school-based cognitive-behavioral intervention for students with deficits in impulse control.

Keywords: Instruction, disinhibition, functions

Executive Functions

Executive functions can be defined as a complex circuitry of directive capacities in the brain that work in a coordinated manner to guide perceptions, emotions, thoughts, and actions (McCloskey et al., 2004; Gioia & Isquith, 2004). While they are not the cognitive structures that carry out the commands themselves, executive functions regulate cognitive capacities in order to shape perceptions, emotions, thoughts, and actions (McCloskey et al., 2004). Deficits in executive functions can result in negative implications for children and adolescents across academic, social, and emotional domains (Best, Miller, & Jones, 2004). Research in this field has widely established the involvement of
the prefrontal cortex and subcortical circuitry in self-regulatory control (McCloskey et al., 2004; Best et al., 2004; Koziol & Budding, 2001). The development of executive function capacities involves progressive changes, including neuronal proliferation and myelination, as well as regressive changes, such as synaptic pruning, which develop throughout adolescence and into early adulthood (Best et al., 2004). The development of executive functions is relatively prolonged compared to the developmental trajectory of other regions of the brain (Best et al., 2004).

The perspective of executive functions has shifted from a unitary construct to a constellation of executive capacities. Research continues to tease apart and define differential executive capacities, and currently, more than twenty executive functions have been identified (McCloskey et al., 2004). Therefore, when examining executive functions, individual patterns of strengths and weaknesses between discrete executive capacities must be assessed in order to develop a comprehensive profile (McCloskey et al, 2004).

**Inhibition**

While various conceptual delineations of executive functions have produced a variety of ways in which executive capacities can be labeled and organized, inhibition appears to be a self-regulatory capacity that is consistently named throughout the literature. Inhibition can be simply defined as the suppression of a dominant or automatized response (Best et al., 2004). When inhibition is not employed correctly, impulsive behavior results. Impulsivity is the rapid and unplanned reaction to internal or external stimuli without concern for negative consequences that may result from the reaction (Moeller et al, 2001). One’s ability to inhibit a response fluctuates based on factors including emotional state, response modality, and the dominance of the suppressed response (Best et al., 2004). Similar to the developmental trajectory of executive functions, the development of inhibitory control matures throughout the later phase of childhood and into adolescence (Best et al., 2004). 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 school and outpatient settings (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, 2002; Steinberg, 2005).
Impulsive behavior is a characteristic of many childhood externalizing disorders including Attention Deficit Hyperactivity Disorder (ADHD), Oppositional Defiant Disorder (ODD), and Conduct Disorder (Kendall & Braswell, 1993).
However, not all children that carry these diagnoses have impulse control deficits (Kendall & Braswell, 1993). Therefore, making an assumption that a child has impulse control deficits based on the presence of a formal diagnosis may be misleading, and as a result, specific evaluation is necessary to confirm deficits in inhibition in order to guide treatment (Kendall & Braswell, 1993). Furthermore, using diagnostic categories as inclusionary criteria for research in the treatment of impulsive behavior may result in samples that possess a large range of variability in the presence and level of intensity of pre-treatment impulsive behavior.

**Underlying Neurological Mechanisms of Inhibition**

Researchers in the field of cognitive neuropsychology have revealed that subcortical regions of the brain are responsible in part for regulating impulsive behavioral and cognitive responding (Koziol & Budding, 2004). Behavior is cued 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, 2004; Muresanu et al., 2002). Dysfunction in this gating system causes either overly inhibited or overly 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 sight for dopamine production (Koziol & Budding, 2004). The release of dopamine causes cellular changes to occur in the brain, which result in newly learned associations with an event (Muresanu et al., 2002). Additionally, inhibition of dopaminergic neurons has been noted when anticipated rewards were not received (Muresanu et al., 2002).
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., 2002).

**Intervention for Deficits in Inhibition**

Since the early 1960s, researchers including Luria, Piaget, and Kohlberg have investigated the relationship between self-verbalization and behavior (Meichenbaum & Goodman, 1971). Vygotsky and colleagues (1962) described inner speech as not simply accompanying behavior, nor as the internalization of external speech, but as mental orientation and conscious understanding that is intertwined with an individual’s thoughts. Inner speech was thought to develop by fading external speech to internalized speech by seven years of age (Vygotsky, Hanfmann, & Vakar, 1962). Research in the area of cognitive-behavioral interventions for students with impulsive, hyperactive, and aggressive behavior became an area of focus in the 1970s with publications by Mahoney (1974) and Meichenbaum (1977) (Robinson, Smith, Miller, and Brownell, 1999). The argument of researchers such as Mahoney and Meichenbaum was that behavior modification was not sufficient in teaching students strategies for lasting results, and suggested that the use of cognitive strategies with behavior modification was critical in learning to self-regulate behavior (Robinson et al., 1999).

With recent research in neuroplasticity revealing the capacity of the brain to modify existing connections in response to a stimulus, and learn something new, we now know that training and practice is the key to developing new connections in the brain (Muresanu et al., 2002). When specifically examining the effects of intervention targeting inhibition, research comparing direct assessment of inhibitory control with concurrent externalizing behaviors in the classroom setting has suggested a developmental lag between the cognitive capacity for inhibition and the behavioral application of impulse control (Best et al., 2004). Thus, the progress that may be observed in an outpatient setting on a direct measure of inhibition will likely not be observed in the classroom setting until much later. With that being said, the exploration of school-based interventions that will promote generalization of skills to the classroom setting is important. Therefore, investigation into school-based cognitive behavioral therapy is appropriate.

**Cognitive Behavior Therapy**

Cognitive Behavior Therapy (CBT) is an empirically supported intervention for many psychiatric conditions including depression, bipolar disorder, eating disorders, post-traumatic stress disorder, and social phobia (DuPaul et
al., 2002). CBT utilizes strategies in order to facilitate the training of executive control processes to improve one’s control over emotions, thoughts, and actions (McCloskey et al., 2004). Although CBT has not been traditionally conceptualized as an intervention for students with executive function deficits, research has provided evidence that CBT improves self-directed capacities (McCloskey et al., 2004). CBT is particularly useful with students who have executive function deficits because the strategies increase awareness of the internal cueing and regulating functions over perceptions, thoughts, feelings, and behaviors (McCloskey et al., 2004). CBT utilizes many strategies to assist in the development of cueing and regulating perceptions, thoughts, feelings, and behaviors, including, but not limited to, self-instructional training, problem solving, affective education, behavioral contingencies, and homework.

**Self-instructional training.**

Self-Instructional Training (SIT), also described in CBT literature as self-talk, originated from Vygotsky’s theory that internalized verbal commands control behavior (Kendall & Braswell, 1993). This theory was later elaborated by Luria’s developmental theory of internalized verbalizations where a child’s behavior is initially controlled by external commands, and then shifted to the child stating the commands, and finally concludes with the child internalizing the command (Kendall & Braswell, 1993). Thus, the internalized verbal command regulates behavior. Luria proposed that by six years of age, a child should have the capacity to internalize commands and control behavior (Kendall & Braswell, 1993).

Criticism for self-instructional interventions have focused on the lack of generalizability across home and school settings. The results of Douglas, Parry, Marton, and Garson’s investigation in the 1970s, highlighted the effects of self-instruction with hyperactive boys on direct measures of cognitive and visual-motor skills, but the effects of self-instruction did not generalize to the home and classroom settings (Kendall & Braswell, 1993).

**Problem solving**

Interpersonal social problem solving is a critical skill for success across home, school, and community settings. A requirement for implementation of problem solving, however, is to first inhibit an automatic response to a problem situation. Only then can the student implement the problem solving process, which involves learning to identify the problem, generate solutions, evaluate the choices, select an option, develop a plan, and then
evaluate the outcome (Kendall & Braswell, 1993).

**Affective education**

Depending on the individual skill level of the student participating in therapy, instruction in recognizing emotions within oneself and recognizing emotions in others may be necessary (Kendall & Braswell, 1993). Part of affective education is helping the student to make connections between emotions and emotional reactions to situations, and the utility of strategies such as self-instruction to control and modulate their emotional reaction to a level that matches the setting (Kendall & Braswell, 1993).

**Behavioral contingencies**

Behavioral strategies are commonly incorporated into the practice of CBT, particularly with children and adolescents. In order for children with clinical levels of impulse control, however, to have success in learning and implementing cognitive strategies, behavioral contingencies must be incorporated (Kendall & Braswell, 1993). Because the subcortical structures that control inhibition are closely connected with dopaminergic centers of the brain, incorporating externally reinforcing elements to an intervention for increasing impulse control is necessary for long-term effects. Even prior to learning about the neurophysiological connections between inhibition and dopamine production sites, researchers had realized that reinforcement was a critical component to intervention. It was noted that without reinforcement for implementing learned strategies, students would be pulled toward alternative behaviors that were automatically or naturally reinforcing (Kendall & Braswell, 1993). In Kendall’s CBT program for impulsive children, entitled *Stop and Think* multiple levels of reinforcement were utilized including self-reward, social reward, response-cost, self-evaluation, rewards for homework assignments, and rewards at termination of the intervention (Kendall, 2003).

**Homework**

Assignments that are to be completed between sessions are a hallmark of CBT. When working with students with impulse control deficits, the use of this strategy is no exception. Because children and adolescents are not typically fond of homework assignments, gradually increasing the complexity of the assignment is beneficial, as well as linking the completion of the assignment to a reward (Kendall & Braswell, 1993).
Culturally Responsive CBT

Multicultural Therapy (MCT) has emerged over the past decade, and it has emphasized the importance of cultural competence across therapeutic approaches and research (Hays, 2005). Hays (2005) developed a framework intended to guide practitioners in the consideration of various aspects of multiculturalism. Hays’ framework uses the acronym ADDRESSSSING to represent the facets of multiculturalism that should be considered in therapeutic practice. Included in these considerations are Age and generational influence, Developmental Disabilities and disabilities acquired later in life, Religion and spiritual orientation, Ethnic and racial identity, Socioeconomic status, Sexual orientation, Ethnic and racial identity, Socioeconomic status, Sexual Orientation, Indigenous heritage, National origin, and Gender (Hays, 2003).

When working within the framework of culturally competent CBT, the therapist must consider culture within all aspects of their work (Hays, 2003). The influence of culture on the therapist, on the client, on the therapeutic relationship, and on the specific strategies implemented during sessions must be contemplated. This process begins prior to the initial session with a client, where the therapist must come into the session with an understanding of how culture has impacted his or her own life and perspective of the world. When beginning to work with a new client, integration of cultural considerations into the initial assessment is critical in developing a therapeutic relationship with the client (Hays, 2003). A culturally competent practitioner will emphasize respect over rapport building, particularly when working with individuals of Asian, Native American, African, African American, Latino, and Middle Eastern cultures (Hays, 2003). Additionally, incorporating culturally related personal strengths into the assessment and treatment process will not only assist in developing a therapeutic alliance, but also increase the likelihood of adherence to treatment (Hays, 2003). Taking time clarify the distinction between the parts of the client’s problem that are external and those that are more cognitively based is important in order to avoid attributing pathology to an individual’s problems when in actuality the environment is a contributing factor (Hays, 2003). Additionally, building an alliance that is viewed as collaborative rather than authoritative with the client that belongs to a minority group is critical in building trust within the therapeutic relationship (Hays, 2003).

Once treatment has begun, emphasis should be placed on assisting clients to make changes with regard to their environment with minimal stress, while promoting personal strengths.
and support (Hays, 2003). If a client reports feelings of oppression during a session, the therapist should validate the clients’ reported feelings of oppression rather than automatically minimizing their feelings or explaining the situation away (Hays, 2003). It is a common practice in CBT to investigate alternative hypotheses as to why a problem or event occurred or affected the client in a particular way. Taking on this exploratory approach may be perceived as evidence of a racist attitude on the part of the therapist (Hays, 2003). When using techniques such as cognitive restructuring where the therapist questions the validity of a belief, the questioning may be perceived as uncaring (Hays, 2003). Instead, a more culturally responsive approach would be to ask the client if thinking in such a manner is helpful to them, and then consider the advantages and disadvantages of the belief (Hays, 2003). In general, avoiding conversations in which core cultural beliefs are challenged is recommended in culturally responsive therapeutic approaches (Hays, 2003).

**Summary of Research**

Research in the field of executive functions has determined that multiple directive capacities regulate perceptions, thoughts, feelings, and behavior. Combinations of deficits in various executive capacities can result in deficits across home, school, and community settings. Inhibition is a core executive capacity that spans across most theoretical models of executive functions. Because inhibition is the suppression of an automatic response, this skill is fundamental in impeding interfering perceptions, thoughts, feelings, and behaviors in order to learn and apply learned strategies in the classroom setting. Furthermore, inhibition is a necessary skill for suppressing socially undesirable behavior in the context of a given social setting. Students with deficits in impulse control tend to engage in behaviors that are disruptive to the classroom environment. Their behaviors can also become a distraction for their own learning. As a result, these students present with behaviors that are impeding the learning of themselves and others. Students who engage in impulsive behavior in the school setting leave school staff searching for effective and efficient interventions. Children with deficits in inhibition possess deficiencies in a cortical-subcortical loop that gates incoming stimuli through the basal ganglia. When students have impulse control problems their underactive basal ganglia does not gate out enough information, and therefore the individual either reacts to the wrong stimuli or reacts too frequently and appears hyperactive. Research in subcortical functions has also provided information regarding the
dopamine production sites that are related to the striatum. When new learning occurs, dopamine production reinforces these new connections, and as a result, increases the likelihood of the newly learned behavior occurring again. In order to strengthen new learning connections, the pairing of behavior and reinforcement of dopamine production must be repeated and practiced in the environment in which the interfering stimuli is present. Using cognitive strategies paired with behavioral reinforcement, the implementation of a carefully construction cognitive behavioral therapy program in the school setting would theoretically be effective in improving the impulse control in children and adolescents. Research has been conducted using cognitive behavior therapy programs with populations that have clinically significant levels of inhibition deficits, including ADHD. Results of these studies have shown negative results in terms of generalizability of the learned strategies into the classroom setting. However, these studies have not incorporated behavioral contingencies with cognitive instruction in the classroom setting. Integrating the cognitive behavior therapy program into the school setting will increase the likelihood that the student will utilize the strategies in the classroom environment because practice of inhibiting impeding stimuli was done in the natural setting.

References


San Jose, CA: Think Social Publishing.


