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Adult ADHD and the Relationship Between Self-Reported Frequency of Cognitive Distortions, Anxiety, and Depression

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ADULT ADHD AND THE RELATIONSHIP BETWEEN SELF-REPORTED

FREQUENCY OF COGNITIVE DISTORTIONS, ANXIETY, AND DEPRESSION

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Dissertation Approval

This is to certify that the thesis presented to us by _Craig Strohmeier_

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Abstract

Cognitive-behavioral therapy for adults with ADHD often includes strategies to address cognitive distortions. Although identifying cognitive distortions as part of a causal chain related to disorders such as anxiety and depression has been well studied, limited research has focused on the relationship between ADHD and cognitive distortions. The goal of this study was to determine the nature of the relationship between ADHD, cognitive distortions, anxiety, and depression within a group of adult outpatients from an ADHD treatment center ($N = 30$). Results indicated that the severity of ADHD symptomatology, identified through a self-report scale, was significantly related to the self-reported frequency of cognitive distortions. The direct positive relationship between ADHD severity and frequency of cognitive distortions (a) existed independently of comorbid anxiety and/or depression and (b) remained significant when the relationship was explored with a portion of the sample that completed additional ADHD self-report scales for primary inattentive symptoms ($n = 27$). This is one of few studies to explore the nature of the relationship between adult ADHD and cognitive distortions. Furthermore, this study provides empirical support for the inclusion of cognitive-behavioral techniques that consider cognitive distortions in this population.

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Introduction

Statement of the Problem

Attention deficit hyperactivity disorder (ADHD) is characterized by a continual pattern of inattentiveness, hyperactivity-impulsivity, or a combination of the two (American Psychiatric Association [APA], 2000). Current diagnostic criteria require that the disorder manifest in early childhood, when detection generally results from impaired or delayed academic success and additional overt problematic behavior. Furthermore, Weiss, Hechtman, Milroy, and Perlman (1985) found that 70% of individuals diagnosed with ADHD in childhood maintained their symptoms as adults. This results in an estimated 3.4% to 4.5% of the adult population meeting diagnostic criteria for ADHD (Fedele, Hartung, Canu, & Wilkowski, 2010). Accordingly, Barkley (2006) notes that ADHD symptoms persisting into adulthood may negatively impact economic, occupational, social, and academic activities.

Although many of the behaviors consistent with hyperactivity tend to abate with age, significantly disruptive behavioral patterns associated with inattention often persist into adulthood (Kessler et al., 2010). Consequently, adults who experience such symptoms may be accused of having poor self-management and organizational skills. Oftentimes these symptoms are primary treatment targets, with objectives based around organization, planning, graduated task completion, and reducing a patient's susceptibility to distraction (Safren, Perlman, Sprich, & Otto, 2005).

In addition to problems with efficiently managing various life activities, adults with ADHD are at an elevated risk for co-morbid psychopathology. Generalized anxiety and major depression are common co-morbid disorders in the adult ADHD population

(Barkley, 2006). Biederman, Faraone, Spencer, and Wilens (1993) found that 20% to 50% of adults with ADHD experience clinically significant levels of anxiety and 8% to 44% experience clinically significant levels of depression. These comorbid disorders bring about additional difficulties for adults with ADHD and may affect treatment effectiveness (Barkley, 2006). For instance, individuals with comorbid anxiety and depression along with ADHD are more likely to have a poorer response to psychostimulant treatment and demonstrate less cognitive flexibility in regard to the psychological sequelae of ADHD (Barkley, 2006).

In light of the various forms and subtypes of ADHD, a clinician must obtain a full and accurate psychosocial profile in order to consider which treatment targets will have the greatest impact on the patient's symptoms (Barkley 2006; Ramsay, 2010). Targeting negative thoughts, or cognitive distortions, is considered an important factor in effective cognitive-behavioral treatment for adults with ADHD (Ramsay & Rostain, 2007). Nonetheless, while cognitive-behavioral treatments afford the flexibility to target dysfunctional automatic thoughts and/or cognitive distortions (Ramsay, 2010; Safren et al., 2005), limited empirical research exists to inform clinicians about the relationship between adult ADHD and cognitive distortions (Mitchell, Benson, Knouse, Kimbrel, & Anastopoulos, 2013). Thus, a rationale for the inclusion of such techniques may be considered incomplete. Therefore, research that identifies the nature of the relationship between adult ADHD, cognitive distortions, and comorbid psychopathology has the potential to assist clinicians in efficiently managing their treatment of adult ADHD.

Review of Relevant Literature

Adult ADHD. Many adults exhibiting hyperactivity, impulsivity, and inattention report having the symptoms in some form at a young age. These findings are in contrast to the early beliefs that the impulsive, hyperactive, and inattentive behaviors of children and adolescents were likely to abate as an individual reached adulthood (Still, 1902; Wender, 1971). In addition to the likelihood that over half of children diagnosed with ADHD will maintain their symptoms into adulthood, it is currently estimated that up to 4.5% of adults in the U.S. meet full diagnostic criteria for ADHD (Fedele et al., 2010Weiss et al., 1985). Adults with ADHD are often accused of willfully engaging in poor self-management and problem-solving skills. As a result, they often suffer emotionally, financially, and socially (Barkley, 2006). Many of these difficulties are associated with primary inattentive symptoms. Kessler et al. (2010) noted that symptoms of inattention persist into adulthood at a significantly higher degree than hyperactive/impulsive symptoms for adults.

Because ADHD was originally conceptualized as a disorder primarily affecting children and adolescents who would eventually "grow out of it," descriptive criteria utilized for diagnosis rarely provides an accurate framework for capturing the disorder in adults (Barkley, 2006; Ramsay, 2010). Consequently, the prevalence reported in some studies may be low due to the use of childhood diagnostic criteria for adult participants (Kessler et al., 2005). To adjust for the sensitivity of the criteria to childhood and adolescent symptoms, it is recommended that clinicians adhere to the formally established diagnostic criteria for individuals 4 to 16 years of age, and flexibly apply

lower thresholds of diagnostic criteria for adults thought to meet criteria for ADHD (Barkley, 2006).

ADHD and comorbid psychopathology. Another complication associated with adult ADHD is the high occurrence of comorbid psychopathology. Young, Toone, and Tyson (2003) reported that anxiety and depression were frequently diagnosed comorbid conditions in the adult ADHD population. Similarly, Young et al. (2003) found significant main effects between a nonclinical control group and an ADHD group in areas of increased comorbid anxiety [$f(2, 62)=13.91, p < 0.001$] and comorbid depression [$f(2, 62)=12.74, p < 0.001$] (p. 751). Young et al. (2003) concluded that perhaps comorbidity could be explained as follows: A longstanding history of failure is likely to result in low self-esteem and demoralization resulting in individuals avoiding certain situations, anticipating failure, lacking in confidence, and feeling misunderstood by others (p. 752). Many of the adults who comprised the ADHD group in the Young et al. (2003) study reported an early onset of difficulties in social and academic functioning. The authors noted that many adults experienced social difficulties as children due to conduct problems and other overt disruptive behaviors related to ADHD. In many adult cases, the emotional sequelae from past difficulties are often internalized and contribute to comorbid anxiety and depression.

Clinical evidence suggesting high rates of anxiety and depression in adults with ADHD has led researchers to investigate how these conditions may impact an individual's daily life. Knouse et al. (2008) examined the expression of symptoms and resultant levels of impairment experienced by individuals with ADHD and comorbid anxiety and/or depression. Results of the study indicated that individuals with ADHD,

specifically those with high levels of inattentive symptoms, were more likely to report

decreased positive affect, increased negative affect, and an overall higher level of

distress. In another study investigating the impact of ADHD symptoms on daily life

activities, Chao et al. (2008) examined scores on the Beck Anxiety Inventory (BAI) and

Beck Depression Inventory, Second Edition (BDI – II) to explore co-occurring anxiety

and depression in an adult ADHD population. The investigators reported significant

differences between the ADHD group and a nonclinical control group. The ADHD group

reported significantly elevated scores on the BAI and BDI – II. This research suggests

that adults diagnosed with ADHD may be more likely to report symptoms associated

with both anxiety and depression than individuals without ADHD.

Cognitive-behavioral therapy and cognitive distortions. ADHD

notwithstanding, the treatment for individuals with anxiety, depression, and several other

psychological disorders involves targeting some variant of cognitive distortion (i.e.,

inaccurate schema, belief, attitude, expectation, thought, etc.) in addition to behavioral

activation, problem-solving, and exposure strategies. These treatment components have

been longtime staples of cognitive-behavioral interventions (Beck, 1967; 1970; Brewin,

1996). The history of cognitive-behavioral therapy and the identification of cognitive

distortions can be largely traced back to A. T. Beck's (1967) landmark clinical work.

Beck (1967) emphasized how depressed patients' self-reported thought patterns (i.e.,

cognitive distortions, cognitive errors, negative automatic thoughts, etc.) related to their

overt depressive behaviors. Beck ingeniously organized his clinical discoveries into a

format of psychotherapy that began with recognizing the environmental events that

occasioned cognitive distortions and explored the idiosyncratic topography of these cognitive distortions (Beck, 1970).

Initially, Beck (1967) identified five original cognitive distortions in the form of *arbitrary inference, selective abstraction, overgeneralization, magnification and minimization, and inexact labeling* (pp. 234-235). Arbitrary inference refers to the premature drawing of a conclusion before gathering the evidence to support the conclusion. Selective abstraction involves honing in on the unfortunate details of a situation and failing to see the "big picture." Overgeneralization involves generating a global conclusion about a situation or experience based on a single factor. Magnification involves exaggeration of a potential problem, whereas minimization entails underestimating the significance of an event. Inexact labeling involves labeling an experience in a manner that inaccurately portrays it as more significant or dire than it is when all of the evidence is considered.

Other theorists such as Ellis and Dryden (1997), Burns (1990,1999), and Freeman and DeWolf (1992) have elaborated on this list of cognitive distortions. It could be said that the cognitive distortions described by other theorists can be traced to Beck's original five distortions. Largely, the changes made by other theorists are nominal and stylistic, designed to fit the particular conceptual style of each theorist and at a vocabulary level intended to make terms more understandable for patients.

Ellis and Dryden (1997) discuss 12 cognitive distortions developed around the notion that psychological distress arises from self-evaluative distortions that stem from self-imposed *musts* and *shoulds*. These distortions include *all-or-none thinking, jumping to conclusions and negative non sequitors, fortune-telling, focusing on the negative,*

disqualifying the positive, allness and neverness, minimization, emotional reasoning, labeling and overgeneralization, personalizing, phonyism, and perfectionism. Burns (1990/1999) developed a list of cognitive distortions based on his "TEN FORMS OF TWISTED THINKING" (p. 8). Again, the distortions are similar to those previously mentioned, and include *all-or-nothing thinking, overgeneralization, mental filter, discounting the positive, jumping to conclusions, magnification, emotional reasoning, and 'should statements.'* Freeman and DeWolf (1992) highlight the "Ten Dumbest" (p. 12) thinking mistakes that individuals make, oftentimes leading to psychological distress. The mistakes, or cognitive distortions, are noted as *the Chicken Little syndrome, mind reading, personalizing, believing your press agent, believing (or inventing) your critics, perfectionism, comparisonitis, what-if thinking, the imperative should, and yes but-ism.*

Yurica (2002) found empirical support, through factor analysis, for the following 11 cognitive distortions: externalization of self-worth, fortune-telling, magnification, labeling, perfectionism, comparison to others, emotional reasoning, arbitrary inference/jumping to conclusions, minimization, mind-reading, emotional reasoning and decision-making. The factor analysis that yielded the above cognitive distortions led to the development of the Inventory of Cognitive Distortions (ICD) (Yurica & DiTomasso, 2002).

Rosenfield (2004) provided a review of several other instruments that have been developed for evaluating some variant of cognitive distortion, including the Dysfunctional Attitude Scale (DAS; Weissman & Beck, 1978), the Automatic Thoughts Questionnaire (ATQ; Hollon & Kendall, 1980), the Cognitive Error Questionnaire (CEQ; Lefebvre, 1981), the Cognitive Distortion Scale (CDS; Briere, 2000), and the Inventory

of Cognitive Distortions (Yurica & DiTomasso, 2002) (Rosenfield, 2004). It was noted

that that although all of the measures provided some degree of utility for assessing a

particular population or content area of cognitive distortion, only the ICD, a) is useful for

a broad spectrum of diagnostic syndromes rather than one in particular (i.e., Depression),

b) provides a factor-analyzed list of 11 various distortions, and c) effectively illuminates

an operationalized description of cognitive distortion.

Since the development of Yurica and DiTomasso's (2002) ICD, several doctoral

dissertations have used the instrument to investigate the role of cognitive distortions in

psychopathology (Rosenfield, 2004; Shook, 2010; Tate, 2006; Uhl, 2007). The ICD is a

reliable, internally consistent instrument for identifying an individual's self-reported

frequency of cognitive distortions (Rosenfield, 2004; Yurica, 2002). Frequency of

cognitive distortions has been found to positively correlate with the severity of

psychological impairment (Rosenfield, 2004). Furthermore, Rosenfield (2004) found that

the total number of psychological disorders across Axis I and II co-occurred with a higher

frequency of reported cognitive distortions, regardless of the severity of the disorders.

Therefore, given the likelihood of comorbid psychopathology and complex psychological

distress associated with ADHD, the ICD is an appropriate instrument for identifying the

frequency of cognitive distortions for the population in the current study.

After identification of cognitive distortions, one primary therapeutic strategy

originally espoused by Beck (1970) was termed *distancing* (p. 189). In general, the

process of distancing involved examining cognitive distortions and accurately

distinguishing between the characteristics of the cognitive distortion and the facts

existing in external reality. In distancing, a patient is taught to recognize a thought as

merely a hypothesis, which can be distinguished from contingencies that exist in the external reality of the patient's life. In other words, a large portion of the therapeutic experience was directed towards demonstrating to the patient that, "simply because he *thinks* something does not necessarily mean that it is true" (Beck, 1970, p. 190). Several variations of the original distancing strategy have become a foundation for treatment from a cognitive-behavioral perspective.

Leahy (2003) reviews several strategies based on the original cognitive model of A. T. Beck (Beck, 1967; Beck, Rush, Shaw, & Emery, 1979). One such technique that captures similar processes to distancing is known as *distinguishing thoughts from facts* (Leahy, 2003, p. 11-13). Using this technique, patients are encouraged to recognize that thoughts are oftentimes inferences rather than empirical truths, sometimes including arbitrary and inaccurate content. Therefore, when in a difficult situation in which cognitive distortions typically co-occur, one should proceed with a thorough examination of the facts, or actual contingencies that are in effect, beyond thoughts.

Beck's original work also motivated individuals with interests in experimental and behavioral psychology to further explore the role of distancing in addressing complex human problems. Zettle and Hayes (1982) viewed the method of distancing from a behavior analytic framework of rule-governance. Zettle and Hayes (1986) noted that an important therapeutic strategy may involve teaching a patient how to observe the derived relations from their self-generated rules before following them literally and without question.

Zettle and Hayes (1986) named their version of the distancing strategy *comprehensive distancing* because context and function was emphasized, rather than

content. This approach emphasizes that the primary reason for psychological distress was not that the rules exist and cause distress on their own, rather the distress is caused by the consequences of following the rules (Zettle & Hayes, 1986). Comprehensive distancing is now referred to as cognitive defusion (Hayes, Levin, Plumb-Vilardaga, Villate, & Pistorello, 2011). Cognitive defusion is a therapeutic strategy designed to address the cognitive and behavioral inflexibility from cognitive fusion. Cognitive fusion develops when individuals view all of their thoughts factually, utilizing a literal translation of their thoughts as rules to guide their behavior (Hayes et al., 2011; Luoma, Hayes, & Walser, 2007). From this perspective, similar to early forms of cognitive-behavioral therapy, it is extremely useful to identify cognitive distortions in therapy. For example, the patient may first be taught to identify the topography, or content, of the cognitive distortion. Next, in line with a functional contextualistic philosophy of cognitive-behavioral therapy, the patient is taught to examine the potential function and current context of the cognitive distortion and whether it should be followed literally or flexibly in relation to current environmental contingencies (Luoma et al., 2007). In regard to the current study, cognitive distortions may be viewed as inaccurate rules that are created and followed by an individual with ADHD and other forms of psychopathology.

Theoretical accounts of ADHD and cognitive distortions. To provide a more adequate account of how the identification of cognitive distortions may be a beneficial addition to treatment for adult ADHD, the following section includes a description of current theoretical interpretations of ADHD. Descriptions by Hayes, Barnes-Holmes, and Roche (2001) and Hayes, Gifford, and Ruckstuhl (1996) executive functions and rule-governance, accompanied with Barkley's (1997, 2001, 2006) model of behavioral

disinhibition and executive functions, capture the most progressive theoretical

interpretations of dysfunction associated with adult ADHD.

Basic and applied research on rule-governed behavior provides scientific support

for the basic behavioral principles underlying theories that describe executive functions.

Rule-governance and rule-governed behavior refers to behavior that is sensitive to verbal

antecedent stimuli (Catania, 2007). For example a parent may tell a child to look both

ways before crossing the street. This verbal antecedent stimulus implies the contingency,

"If you don't look both ways before crossing the street, then you may get hit by a car." It

is in the child's best interest to comply with this verbal antecedent stimulus, rather than

rely on the direct consequences of not looking both ways behavior. Hayes et al. (2001)

reported that part of human language development involves the tendency to comply with

verbal antecedent stimuli that are correlated with past histories of reinforcement and

punishment. Following helpful rules from others or in the form of self-talk provides an

evolutionarily adaptive method for circumventing constant reliance on potentially

harmful direct contact with contingencies (Barkley, 2001).

This tendency of rule following, seemingly unique to verbal humans, has

advantages and disadvantages. For example, Hayes (1986) outlined a standard format for

experiments on rule-governed behavior in which individuals are given rules about how to

interact with an experimental apparatus in order to gain access to reinforcement. In

contrast to a nonhuman's scalloped response pattern during a fixed-interval schedule,

some individuals respond at a high rate, while others respond at a low rate. In describing

their response to the fixed-interval schedule of reinforcement, individuals who respond at

a high rate typically describe a rate-based schedule, while individuals who respond at a

low rate describe an interval-based schedule. Essentially, individuals may follow self-generated rules to guide their behavior when a schedule of reinforcement is not conspicuous. Furthermore, when individuals are told that they can access reinforcement in accordance with a particular schedule, their rate of responding will tend to match the rule rather than the actual schedule.

In the previously described example, only when individuals were told to engage in another verbal behavior that competed with their attempt to follow a ratio or interval schedule "rule" (i.e., solving an arithmetic problem covertly while simultaneously engaging the experimental apparatus) did they contact reinforcement in a pattern that aligned with the contingencies of the active schedule. Overall, it seems that humans are uniquely susceptible to arbitrarily applying inaccurate, or distorted, self-generated rules to a situation, which in turn limits their access to the current contingencies of reinforcement.

Hayes et al. (1996) draw parallels between the principles of rule-governance and the theoretical assumptions of the executive functions. In short, the executive functions involve covertly choosing among available self-generated rules in the most efficient manner for a particular context. Barkley (1997, 2006) eloquently describes his theories of behavioral inhibition and executive functions in a manner that aligns with the basic science of rule-governance.

Barkley's (1997, 2006) theory identifies behavioral disinhibition (or lack of inhibition associated with self-control) as the primary contributor to the deficits in executive functioning exhibited by individuals with ADHD. The inhibition of a prepotent response and interference control play critical roles in behavioral inhibition (Barkley,

2006). A prepotent response refers to behavior, or a class of behaviors, that has been previously followed by immediate reinforcement. Interference control involves discriminating between stimuli that are relevant to a current desired outcome of behavior (i.e. a discriminative stimulus), and those stimuli that are irrelevant (i.e., an s-delta). Problems with behavioral, or response, inhibition is the amalgamation of a sequence of behaviors, including:

> . . . (a) inhibition of the initial prepotent response to an event; (b) stopping of an
> ongoing response, which thereby permits a delay in the decision to respond; and
> (c) the protection of this period of delay and the self-directed responses that occur
> within it from disruption by competing events and responses (interference
> control). (p. 67)

In Barkley's (2006) description, individuals maintain self-management, or self-regulation, through the covert prepotent response inhibition, stopping of an ongoing response, and interference control (Barkley, 1997, 2006). Therefore, Barkley's theory of behavioral inhibition is greatly one of (covert) self-management of responses that results in a more efficient utilization of the executive functions and subsequent motor control (overt behavior). Self-management, or self-regulation as it is referred to by Barkley (1997, 2001, 2006), may be viewed as the result of well-organized behavioral (response) inhibition. Barkley (2001) regards the first aspect of response inhibition as the most central to effective utilization of the executive functions. The following considers the nature of inhibiting a prepotent response and its relationship to self-control/self-regulation.

Inhibiting a prepotent response involves the regulation of one's actions by delaying a response that has previously resulted in immediate positive or negative reinforcement (Barkley, 1997, 2006). A prepotent response maintained by the function of access to positive reinforcement may involve an individual completing a task and immediately receiving something that leads to an increased probability that he or she will perform the same or a similar task in order to receive a similar positive reinforcer in the future. Conversely, a prepotent response maintained by the function of escape or avoidance (negative reinforcement) may involve an individual's tendency to engage in a behavior that removes something aversive, leading to an increased probability that the same or a similar behavior will be performed in the future to escape a similar aversive stimuli. For an individual diagnosed with ADHD, problems arise when he or she fails to bypass, or inhibit, the prepotent response associated with immediate reinforcement, either positive or negative. Essentially, inhibiting a prepotent response is demonstrated by the ability to withstand a temporally extended absence of positive or negative reinforcement. For example, an individual diagnosed with ADHD may intend to sit down at his or her desk and complete a school assignment that is due in 1 week, but moments after sitting down they instead pick up the cell phone on the desk and call a friend to discuss plans for that evening. This scenario may repeat itself in some form until hours (or minutes) before the school assignment is due. Instead of engaging in behavior that would result in reinforcement presented in the future (working towards completion of the assignment), the individual engaged in a behavior with a consequence of immediate reinforcement (pleasant discussion with a friend).

Barkley utilizes the term executive to describe an ". . . act toward oneself that functions to modify one's own behavior so as to change the future outcomes for that individual. Such actions may be covert, but need not be so to be classified as executive." Through evolution and the process of selection by consequences, those individuals who have internalized their executive functions are able to respond to their internal and external environment most efficiently (Barkley, 2001). Because executive functioning describes a process of responding, it would be difficult to explain adult ADHD in terms of this process alone. The executive functions occur amid a context, and for an adult with ADHD this context may include inaccurate self-generated rules, or cognitive distortions.

Linking ADHD, cognitive distortions, rule-governance, and the executive functions. Principles of rule-governance and theories of behavioral disinhibition and the executive functions may relate to cognitive distortions and the impairments experienced by adults with ADHD across several domains. First, if cognitive distortions are viewed as a form of inaccurate rule that individuals tell themselves, and these rules are followed rather than adjusting to actual contingencies in the environment to formulate new rules, then failure and emotional distress may result. This may account for the distress experienced by anyone who acts in accordance with cognitive distortions. Disentangling oneself from the inaccuracy of cognitive distortions may require intact executive functions. Hayes et al. (1996) noted that delaying overt behavior in order to choose among available rules to follow is a property aligned with the executive functions. Because behavioral inhibition and the executive functions are potentially deficient for an individual with ADHD, they are more likely to behave in accordance with cognitive distortions due to a past history of reinforcement for following distorted rules, rather than

consciously reflecting on the cognitive distortions and generating alternatives. For example, an individual with ADHD may sit down to complete a difficult assignment and think, "I can't do this assignment, and it's going to take forever!" This thought may be characterized as a cognitive distortion in the form of dichotomous thinking and emotional reasoning. If this individual has impaired behavioral inhibition and executive functions, they may not deliberate on the consequences of following this distortion and act accordingly to minimize, or not even consider the potential consequences of following such distortions. Nonetheless, although clinicians recognize that targeting cognitive distortions and emotional distress in the treatment of adult ADHD is useful, literature that relates the factors associated with ADHD, distorted thinking, and emotional disturbance is still largely tenuous.

Empirical studies relevant to adult ADHD and cognitive distortions. A search on PsycINFO for relevant empirical studies involving an investigation of inaccurate thought patterns (i.e., cognitive distortions, negative automatic thoughts, dysfunctional attitudes, etc.) and their relationship to adult ADHD yielded two studies (Abramovitch & Schweiger, 2009; Mitchell et al., 2013). Abramovitch and Schweiger (2009) studied intrusive and worrisome thoughts in a college population of adults diagnosed with ADHD. Intrusive and worrisome thoughts reported by adults with ADHD were significantly higher than in a non-ADHD control group. Mitchell et al. (2013) examined the relationship between negative automatic thoughts and adult ADHD. Results from this study indicated a significant positive relationship between negative automatic thoughts and inattentive, but not hyperactive-impulsive symptoms. When considering comorbid depressive symptoms, it was demonstrated that the group with ADHD and depression

reported experiencing more severe negative automatic thoughts than the ADHD only

group, and both groups reported experiencing more severe negative automatic thoughts

than the control group.

   Purpose of the study. The present study endeavored to address a paucity of

empirical research regarding the relationship between adult ADHD, cognitive distortions,

and comorbid psychopathology. Review of the literature provides research that

demonstrates evidence of a relationship between cognitive distortions and a variety of

Axis I and Axis II conditions and symptomatology (Rosenfield, 2004; Yurica, 2002).

Nonetheless, no extant research has investigated the relationship between cognitive

distortions and ADHD. Consequently, the goal of the current study was to further explore

the nature of the relationship between adult ADHD and cognitive distortions.

Furthermore, because previous research has demonstrated that symptoms of anxiety and

depression, as measured by the BAI and BDI – II, are related to the presence of cognitive

distortions (Yurica, 2002), the current study considered the influence of cognitive

distortions in regard to a relationship between adult ADHD and comorbid

psychopathology.

   Hypotheses. The current study explored a potential relationship among ADHD,

cognitive distortions, anxiety, and depression. Accordingly, it was hypothesized that (H_1)

there is a direct, positive relationship between ADHD and cognitive distortions, (H_2)

there is a direct, positive relationship between ADHD and anxiety, (H_3) there is a direct,

positive relationship between ADHD and depression, and (H_4) there is a direct, positive

relationship between ADHD and hopelessness.[1] In addition, cognitive-behavioral models

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[1] Hopelessness, operationalized as total BHS score, was included as an additional measure of depression
due to its reliability in detecting depression.

of psychopathology have previously described cognitive distortions as playing a vital role in maintaining symptoms of anxiety and depression (Beck, 1967; Beck, et al., 1979); therefore, additional hypotheses were developed to test whether the presence of anxiety and depression accounted for any relationship between ADHD and cognitive distortions. Specifically, it was hypothesized that (H_5) cognitive distortions would partially mediate the relationship between ADHD and anxiety, (H_6) cognitive distortions would partially mediate the relationship between ADHD and depression, and (H_7) cognitive distortions would partially mediate the relationship between ADHD and hopelessness.

Methods

Research Design

A correlational research design was used to explore the relationship between

ADHD, operationalized as a Brown Attention Deficit Disorder Scale (BADDS) total

score; frequency of cognitive distortions, operationalized as a total score on the ICD;

anxiety, operationalized as a total score on the BAI; and depression, operationalized as a

total score on the BDI – II and/or Beck Hopelessness Scale (BHS). Hypotheses

formulated a priori specified the use of the BADDS total score as the measure of adult

ADHD. The BADDS total score was chosen because a) clinicians complete the BADDS

with patients at the center, and b) the BADDS total score has been shown to reliably

predict a diagnosis of ADHD (Kooij et al., 2008).

Participants

Archival data was gathered from the charts of 44 adults who participated in

assessment and/or treatment at a specialty outpatient adult ADHD treatment and research

center in a northeastern city. Participant data was considered eligible for inclusion in this

study if the participant's age was between 18 and 88 years of age and the participant had

completed Connerss Adult ADHD Rating Scale (CARRS), BADDS, ICD, BAI, BDI – II,

and BHS during initial intake at the center. Participants excluded from the study included

those outside of the age criteria and individuals with co-occurring substance abuse

disorders and/or psychotic disorders as determined at intake via clinical interview and/or

SCID – I. Data from 44 charts were reviewed and 30 met criteria for inclusion in the

study.

Measures

Beck Anxiety Inventory (BAI). The BAI is a 21 item self-report scale that reviews primary physiological/somatic symptoms and panic symptoms of anxiety (Beck & Steer, 1990). Patients are asked to rate the severity of each symptom on a 4-point scale ranging from 0 (*not at all*) to 3 (*severely, I could barely stand it*). A total score from 0 to 63 is calculated by summing the severity ratings for all 21 items. A total score < 7 indicates a minimal level of anxiety, 8 to 15 indicates a mild level of anxiety, 16 to 25 indicates a moderate level of anxiety, and a total score > 26 indicates a severe level of anxiety.

Beck, Epstein, Brown, and Steer (1988) conducted initial psychometric analyses during the development of the BAI and found high internal consistency (Cronbach's $\alpha =$ .92) and adequate test-retest reliability ($r = .75$). Furthermore, when compared with a measure of depression, the Hamilton Rating Scale for Depression-Revised (HAM-D: Hamilton, 1960), the correlation of $r = .25$ demonstrated strong discriminant validity (Beck et al. 1988). More recently, Stulz and Crits-Christoph (2010) conducted exploratory factor analyses on the BAI and BDI – II items that resulted in two distinct factors, one for anxiety and one for depression. These results suggest strong support for the BAI's ability to separate the symptoms of physiological hyperarousal associated with anxiety from depressive symptoms.

Beck Depression Inventory, Second Edition (BDI – II). The BDI-II is a 21 item self-report scale that surveys common symptoms of depression on a 4-point scale, each question scored from 0 to 3 (Beck, Steer, & Brown, 1996). A total score from 0 to 63 is calculated by summing the highest ratings for each of the 21 items. A total score of < 13

indicates a minimal level of depression, 14 to 19 indicates a mild level of depression, 20

to 28 indicates a moderate level of depression, and a total score > 29 indicates a severe

level of depression.

Beck, Steer, Ball, and Ranieri's (1996) review of the psychometric properties of

the most recent version of the depression inventory, the BDI – II, yielded high internal

consistency (Cronbach's α = .91) and high test-retest reliability (r = .93). Furthermore,

when compared with a measure of anxiety, the Hamilton Anxiety Rating Scale-Revised

(HAM-A; Hamilton 1959) the correlation was r = .47, demonstrating adequate

discriminant validity (Beck et al., 1996). Stulz and Crits-Christoph (2010) found that the

BDI – II discriminated the internalizing thought disturbance (maladaptive cognitions) and

absence of motivational drive related to depression from the physiological symptoms of

anxiety in a clinical population.

Beck Hopelessness Scale (BHS). The BHS is a 20 item self-report scale that asks

true or false questions regarding an individual's perceived hopelessness (Beck & Steer,

1989). A total score from 0 to 20 is calculated by scoring a 1 for true answers on 10

selected items, and scoring a 1 for false answers on 10 selected items. A total score < 3

indicates a minimal level of hopelessness, 4 to 8 indicates a mild level of hopelessness, 9

to 14 indicates a moderate level of hopelessness, and a total score > 14 indicates a severe

level of hopelessness.

Beck, Weissman, Lester, and Trexler (1974) examined the psychometric

properties of the BHS and found high internal consistency (Cronbach's α = .93), and

Alford, Lester, Patel, Buchanan, and Giunta (1995) found that the BHS was a reliable

measure for predicting hopelessness and depression in both clinical and nonclinical

populations. Three factors emerged from the BHS, after factor analysis: negative

cognitive content about the future, motivation, and expectations (Beck et al., 1974).

Brown Attention Deficit Disorder Scale (BADDS)-Adult Version. The

BADDS is a 40-item self-report questionnaire (Brown, 1996). BADDS items are

organized into five clusters of similar criteria related to symptoms of ADHD. The

BADDS utilizes self-reported symptoms, as they are rated on a scale from 0 (*never*) to 3

(*almost daily*).

The five theoretically consistent clusters of symptoms evaluated by the BADDS

consist of nine items about organizing and activating work, a section regarding sustaining

attention and concentration, nine items about sustaining energy and effort, a section

regarding managing affective interference, and six items about utilizing working memory

and accessing recall (Brown & Whiteside, 2003). Internal consistency for the BADDS is

high (Cronbach's α = .96) and test-retest reliability is adequate, r = .87 (Whiteside,

2003).

Conners' Adult ADHD Rating Scale (CAARS). The CAARS long version,

observer and self-report 66 item forms will be utilized for the current study (Conners,

Erhardt, & Sparrow, 1999). The 66 items are organized into a four-factor structure

(inattention/memory problems, hyperactivity/restlessness, impulsivity/emotional lability,

and problems with self-concept) (Conners et al., 1999). Furthermore, an ADHD index

identifies clinically significant levels of ADHD symptoms, as found in the DSM – IV –

TR. Also included are scales that identify DSM – IV symptoms of inattention,

hyperactivity/impulsivity, and total ADHD symptoms. Each version of the CAARS is

presented in a checklist format, with ratings ranging from 0 (*not at all, never*) to 3 (*very much, very frequently*).

Analysis of the internal consistency for the CAARS indices yielded Cronbach α ranges of .66 to .90 for the self-report form and .81 to .92 for the observer report form (Conners et al., 1999). Test-retest reliability for the long forms of the CAARS was also demonstrated as excellent ($r = .80$ to .95) (Conners et al., 1999). When comparing this measure to other measures that evaluate ADHD, Conners et al. (1999) found acceptable correlations, demonstrating adequate construct validity. The Wender Utah Rating Scale (WURS; Ward et al., 1993) total score correlated soundly with the CAARS-S:L subscales of inattention/memory problems, hyperactivity/restlessness, impulsivity/emotional lability, and problems with self-concept.

Inventory of Cognitive Distortions (ICD). The ICD is a 69-item self-report inventory (Yurica & DiTomasso, 2002). ICD items are comprised of various statements designed to reflect 11 different cognitive distortions, organized through factor analysis. ICD items are scored on a 5 point scale ranging from 1 (*never*) to 5 (*always*). The ICD is scored by totaling the highest ratings for each of the 69 items, resulting in a total ICD score ranging from 69 to 345. The higher the ICD total, the higher the total frequency of reported cognitive distortions.

Yurica's (2002) psychometric evaluation of the ICD concluded that the instrument possessed excellent content and construct validity with 100% expert agreement regarding an accurate illustration of the cognitive distortions retained within the instrument. Test-retest validity ($r = .998$) and internal consistency (Cronbach's α = .98) were both excellent. Furthermore, the instrument demonstrated strong positive

correlations with other measures of distorted thinking and psychopathology such as the

BAI ($r = .59$), the BDI-II ($r = .70$), and the Dysfunctional Attitudes Scale (DAS;

Weissman & Beck, 1978) ($r = .70$), suggesting good concurrent validity.

Rosenfield (2004) further validated the clinical utility of the ICD by analyzing its

ability to capture the distorted thinking of individuals with Axis I and Axis II

psychopathology. Rosenfield determined that the frequency of cognitive distortions was

elevated for a wide variety of individuals with single instances of, or combined Axis I

and Axis II behavioral health disorders. As the number or severity of disorders increased,

so did the frequency of cognitive distortion.

Procedures

All patients at the Adult ADHD Center complete an extensive psychological

diagnostic evaluation as part of the standard intake procedure. After the data were

retained in a patient's chart at the program, a clinician at the center reviewed the chart

and relevant records and gathered data from the patient's scores on the BAI, BDI – II,

BHS, BADDS, CAARS and ICD. A unique coded identification system was created for

each set of data. After all identifying information of the patient was removed through the

coding process, the data were transferred to an electronic database and given to the

investigator.

Results

Demographics

The archival data gathered for this study were for 30 adults (19 male, 11 female, mean age: = 36.7 years, age range: 20 to 60 years) who presented at an outpatient center specializing in the assessment and treatment of ADHD.

Statistical Analyses

The Statistical Package for Social Sciences, version 18.0 was used to analyze correlations between the variables of interest. Several two-tailed Pearson correlations were conducted to identify any significant relationships as specified in hypotheses 1 through 4. First, it was hypothesized that there would be a direct, positive relationship between ADHD (BADDS total score) and frequency of cognitive distortions (total ICD score) (H_1). The results indicated a significant direct, moderate relationship between ADHD and cognitive distortions ($r = .487, p = .006$). Second, it was hypothesized that there would be a relationship between ADHD and anxiety (total BAI score) (H_2). The results failed to indicate any significant relationship (r = .306, p = .100). Third, it was hypothesized that there would be a relationship between ADHD and depression (total BDI – II score). The results failed to indicate any significant relationship ($r = .268, p = .153$). Fourth, it was hypothesized that there would be a relationship between ADHD and hopelessness. The results failed to indicate any significant relationship ($r = .202, p = .284$). Correlations, means and standard deviations are displayed in the table below.

Table 1

Correlations, Means, and Standard Deviations for ADHD (BADDS total score),

Cognitive Distortions (ICD total score), Depression (BDI – II total score), Anxiety (BAI

total score), and Hopelessness (BHS total score)

	ADHD	Cognitive Distortions	Depression	Anxiety	Hopelessness	*M*	*SD*
ADHD	____	.487**	.306	.268	.202	72.67	11.040
Cognitive Distortions	.487**	____	.650**	.259	.533**	178.03	46.146
Depression	.306	.650**	____	.114	.677**	10.73	8.300
Anxiety	.268	.259	.114	____	.114	7.53	8.328
Hopelessness	.202	.533**	.677	.114	____	6.13	5.716

**.Correlation is significant at the 0.01 level (two-tailed).

Testing for mediation. Tests for mediation (H_5 through H_7) required significant relationships to be found in hypotheses 1 through 4 (Baron & Kenny, 1986). Since a significant relationship was only found for H_1, mediation could not be tested.

Additional data analysis. Twenty-seven of the participants from the original sample had completed additional measures of ADHD upon intake at the adult ADHD center. Therefore, Pearson correlations were conducted to find additional support for H_1. In particular, a measure of ADHD symptomatology specifically sensitive to adult ADHD (CAARS DSM – IV inattentive subscale) was tested for a relationship to cognitive distortions. Research on the enduring characteristics of adult ADHD has identified inattention as a primary characteristic (Kessler et al., 2010). Therefore, demonstrating empirical support for a relationship between cognitive distortions and a measure of ADHD related specifically to the pervasive symptoms found in adults would be a valuable finding. A relationship was already demonstrated between ADHD and Cognitive distortions (via the initial BADDS/ICD test), indicating that the more severe the ADHD, the more frequent the distorted thinking. Thus, theoretically, there was a strong probability that regardless of the ADHD scale, ADHD severity would again covary in a positive direction with the ICD. To demonstrate that the covariance exists in a positive direction, a one-tailed test was used for an exploratory follow-up analysis to lend further support to the finding that there is a relationship between ADHD and cognitive distortions. The results from this follow-up exploratory analysis indicated a significant direct positive, but weak relationship between ADHD and cognitive distortions ($r = .360$, $p = .033$). Results are displayed in the table below.

Table 2.

Correlations, Means, and Standard Deviations for ADHD (DSM-IV Inattentive Scale)

and Cognitive Distortions (ICD total score)

	ADHD	Cognitive Distortions	*M*	*SD*
ADHD	____	.360*	77.67	12.594
Cognitive Distortions	.360*	____	179.22	46.617

*. Correlation is significant at the 0.05 level (1-tailed).

Discussion

The primary aim of this study was to examine the relationship between cognitive distortions, as measured by the total score on the ICD and ADHD, as measured by total scores on the BADDS and/or CAARS DSM – IV Inattentive subscale. Furthermore, given the wealth of literature in support of the relationship between cognitive distortions, anxiety and depression, as measured by the ICD, BAI, and BDI – II respectively, it was hypothesized that the relationship between ADHD and comorbid conditions of anxiety and depression would be accounted for by cognitive distortions.

In formulating the methods and conceptual framework that guided this study, the previously described aims were magnified by the clinical need for empirical guidance for the inclusion or exclusion of critical components in the delivery of cognitive-behavioral therapy for adults with ADHD. Given the widespread success that cognitive-behavioral therapeutic methods have experienced in the treatment of various forms of psychological distress, it may be tempting for clinicians to apply cognitive-behavioral therapy to any and all psychological disorders. Nonetheless, it may behoove a clinician to be frugal with application of cognitive-behavioral techniques in order to account for the most relevant components of treatment. Therefore, this study strove to provide cognitive-behavioral clinicians with empirical support for inclusion of specific techniques when working with adults with ADHD, in this case, whether or not to consider strategies for addressing cognitive distortions.

The principal hypothesis explored in this study was supported (H_1). There was a direct positive relationship between the severity of ADHD and frequency of cognitive distortions. Although the other hypotheses were either unsupported or unable to be tested,

all of the results provide valuable direction for the psychosocial treatment of adults with ADHD. Implications of the findings are discussed below.

Relationship between ADHD and cognitive distortions. A significant relationship between ADHD and cognitive distortions was revealed in testing hypothesis 1. A moderate, positive relationship was revealed between the severity of ADHD, as measured by the total score on the BADDS, and frequency of cognitive distortions, as measured by the total score on the ICD. This finding is consistent with previous lines of research that found a relationship between variants of cognitive distortions and adult ADHD (Abramovitch & Schweiger, 2009; Mitchell et al., 2013). Although the previous studies did not use the term *cognitive distortions* explicitly, worrisome thoughts and negative automatic thoughts may be considered as constructs under a larger umbrella of cognitive errors or distortion, that occur privately at various levels of conscious deliberation (Alford & Beck, 1997).

The additional analysis that was conducted to strengthen support for hypothesis 1 found a significant, direct, positive, albeit weak, relationship between ADHD, as measured by the CAARS DSM – IV inattentive scale, and cognitive distortions. Although this analysis should be replicated in a separate sample with hypotheses specified at the outset, the results are interpreted here with caution.

The findings from the additional analysis align with previous research that found a significant, direct, positive relationship between inattentive ADHD symptoms and negative automatic thoughts (Mitchell et al., 2013). This finding has particular clinical significance because inattentive symptoms displayed by adults with ADHD have been found to be the most pervasive and enduring of all ADHD symptoms (Kessler et al.,

2010). Furthermore, Kessler et al. (2010) also noted that inattentive symptoms in adults may be indicative of more widespread executive functioning difficulties. As previously discussed, poor executive functioning relates to difficulties in navigating self-generated rules that may be attendant to cognitive distortions. However, these findings lend support to the notion ADHD is a consequence of both executive dysfunction and cognitive distortions.

Several hypotheses were tested regarding the relationship between ADHD and comorbid psychopathology. No significant relationships were found between ADHD and anxiety, ADHD and depression, or ADHD and hopelessness. The lack of significant findings for these hypotheses are in contrast to previous research that has established comorbid psychopathology as a common characteristic of the adult ADHD population (Sobanski, 2006). Although this may be accounted for by the small sample size used in this study, there may be other reasons for the lack of significant findings. The measures of anxiety and depression, BAI, BDI – II, and BHS, are self-report inventories. Relying upon self-report inventories may not have accurately captured comorbid symptoms of anxiety and depression because adults with ADHD may underreport their various impairments (Manor et al., 2012).

Additionally, decreased sensitivity to autonomic nervous system activity may also account for the lack of a significant relationship between ADHD and comorbid mood disorders (van Lang, Dieleman, & Ferdinand, 2007). The van Lang et al. (2007) study noted that physiological distress, measured by heart rate reactivity, was less apparent after a stressful task for adolescents with ADHD. Consequently, a self-report inventory that targets primary physiological symptoms of anxiety (i.e., BAI) may not accurately

reflect other aspects of anxious behavior for someone with ADHD. Conversely, the finding that the relationship between ADHD and cognitive distortions was independent of any comorbid anxiety and depression provides a promising direction for the consideration of cognitive distortions as a characteristic of ADHD and not merely an artifact of comorbid psychopathology.

Clinical implications of findings. Identifying a significant relationship between ADHD and cognitive distortions has several potential clinical implications. In recent years, cognitive-behavioral treatment for adult ADHD have gathered increasing support by clinicians working with such a population (Ramsay, 2010; Ramsay & Rostain, 2008; Safren et al., 2010). However, a recurrent concern expressed by many clinicians is whether or not therapeutic strategies for addressing cognitive distortions warrant inclusion for cases of adult ADHD, in which there is no apparent comorbid mood disorder. Recently, this study and other similar studies (Mitchell et al., 2013) have found relationships between the distorted and/or negative thought patterns that exist independently of other comorbid psychopathology. This line of research provides a degree of empirical support in favor of the inclusion of techniques for addressing cognitive distortions and disturbing thought patterns in the treatment of adult ADHD.

Second, Ramsay (2010), Ramsay and Rostain (2007), and Toplak, Connors, Shuster, Knezevic, & Parks (2008) all reiterate that ADHD is not caused by cognitive distortions. Contemporary contextual behavioral science extends this perspective regarding cognition in general. In short, cognition is not a cause, but rather part of a causal chain of events that can be traced back to environmental antecedents (Herbert & Forman, 2011). In regard to adults with ADHD in particular, findings from this study

support the identification of cognitive distortions, as well as deficits in executive

functioning, as part of this causal chain. In a complete analysis of the behaviors

demonstrated by an adult with ADHD, a chain of behaviors including cognitive

distortions might be traced to an environmental antecedent (e.g., a nonpreferred task,

delayed access to a reinforcing activity, etc.), and a belief system based on current and

past contingencies, in a nonlinear fashion to determine the most efficient targets for

therapy. Such techniques have been staples of cognitive-behavioral therapy since its

inception.

Beck's (1970) strategy described a process of *distancing*, in which an individual

develops techniques for separating the content of thoughts from the actual context within

which they occur. Then, ideally, an overt behavior is demonstrated only after all of the

realistic contingencies are considered. Similarly, Hayes et al. (2001) provide the

description of a *pragmatic verbal analysis*. A pragmatic verbal analysis involves learning

how to analyze one's own covert verbal behavior, delay responding, and solve a problem

in the most efficient manner without having to first contact direct contingencies. In

addition, Leahy (2003) discusses the strategy of *distinguishing thoughts from facts*. In

distinguishing thoughts from facts, individuals are taught to recognize thoughts and

discriminate between the content of thoughts and the facts available in the environment

when attempting to address an upsetting event. In the context of an intervention for adults

with ADHD who experience cognitive distortions, an intervention that follows these

principles may involve (a) identifying and correcting cognitive distortions as they occur

in a context, and (b) withholding a response until alternative behaviors have been

considered. This intervention increases cognitive awareness and delays a behavioral

response, thereby, by definition, increasing both behavioral inhibition and executive functioning as outlined by Barkley's (1997, 2006) theory for adults with ADHD.

Limitations. The current study is limited by the small sample size ($N = 30$). Therefore, the significant correlations found in support of hypothesis 1, which identified a significant, direct, positive relationship between severity of ADHD and frequency of cognitive distortions, should be interpreted with caution. Had the sample size been larger, other significant correlations may have been found when testing the hypotheses. Nonetheless, another factor that may have contributed to the lack of significant correlations between some of the variables examined involves the restricted range of scores on the scales used for measurement of the variables. The scores on the ADHD scales were restricted to a narrow range of elevated scores, while the scales that measured anxiety and depression were restricted to a narrow range of subclinical scores. Research on correlational analysis procedures has demonstrated that when a sample is characterized by a restricted range of covariance on particular variables, the correlation coefficient is reduced (Sackett & Yang, 2000).

Generalizability of the findings should be scrutinized carefully due to the idiosyncratic characteristics of the sample. The sample was comprised of mostly high functioning, college educated individuals who were experiencing a significant degree of impairment at the time of assessment. In addition, 90% of the sample identified as Caucasian, 7% identified as African American, and 3% did not report this information. Therefore, the characteristics of the sample failed to capture a culturally diverse segment of the population.

In regard to data collection, the investigators did not collect the data directly from the participants, limiting the opportunity for behavioral observation during assessment and interviewing. The majority of the archival data for this study was generated by self-report inventories. The inherent lack of validity in self-report forms, compounded with the lack of reliability of self-report of impairments experienced by adults with ADHD also creates limitations of the findings of the current study.

Additionally, no qualitative data was collected. Therefore, the use of any direct observations and consideration of qualitative impressions of the participants could not be integrated into the data collection and process of analyses. Moreover, this investigation did not assess psychotropic medication use in participants. Consequently, it is uncertain whether or not this variable influenced results.

Future directions. As previously mentioned, the integration of research from contemporary psychosocial treatment of adults with ADHD can be elegantly paired with cognitive-behavioral strategies for identifying and addressing cognitive distortions. Distancing, cognitive defusion, pragmatic verbal analyses, and distinguishing thoughts from facts are all strategies that can be utilized for addressing cognitive distortions. Distinguishing thoughts from facts (Leahy, 2003), a strategy stemming from Beck's original (1970) distancing technique, may help individuals to identify a distorted thought and gain perspective, allowing them to remain in situations where escape was previously sought. Furthermore, in regard to cognitive defusion strategies, Hayes et al. (2011) note that mindfulness exercises may attenuate the subjective distress that co-occurs with *negative self-relevant phrases* (as cited in Masuda, Hayes, Sackett, & Twohig, 2004). These techniques emphasize a metaphorical distancing and observing of cognition in

particular contexts. In addition, mindfulness meditation training has also shown promise when used as an intervention to decrease total self-reported ADHD symptoms and increase results on neurocognitive measures of attention (Zylowska et al., 2008). In consideration of the research on adult ADHD, executive functions and cognitive distortions may be pragmatically targeted through the use of one cognitive defusion strategy: mindfulness.

Demonstrating the efficacy of techniques such as mindfulness could be invaluable for an adult ADHD population. Future studies should incorporate measures of cognitive distortions where cognitive therapy strategies are paired with more common ADHD interventions. Pretests and posttests may be utilized to analyze the effects of the interventions on concurrent frequency, distress, and believability of cognitive distortions.

In addition, single-case experiments may be conducted by creating analogue versions of common tests of executive functions to isolate dependent variables, as well as administering the ICD alone or in conjunction with measures that would target degree of belief in the cognitive distortions and co-occurring subjective distress. Techniques that target co-occurring executive functioning difficulties and cognitive distortions could be arranged as independent variables. As previously noted, if the data demonstrates that an intervention can target the domains of attention, cognitive distortions, and subjective distress, this research could then be utilized to develop an empirically derived cognitive-behavior treatment strategy for dissemination to clinicians who routinely treat this population.

Summary and conclusions. Although the identification of troublesome thoughts, or cognitive distortions, is included in the treatment of adult ADHD (Ramsay, 2010;

Ramsay & Rostain, 2008; Rosenfield, Ramsay, & Rostain, 2008), this study is one of only a few that have found empirical support for the relationship between adult ADHD and cognitive distortions. Despite the limitations of a small sample size, a significant relationship between ADHD and cognitive distortions was identified with a general self-report measure of ADHD and one specific to inattention. Addressing cognitive distortions in the treatment of adult ADHD should be considered in light of this study, and other recent empirical findings (Mitchell, et al., 2013). Continuing to unveil the relationship between ADHD and cognitive distortions could provide therapeutic benefits across several domains of impaired functioning for adults with ADHD.

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Appendix A

Early Accounts of ADHD Behavior: History of an Evolving Diagnosis

The earliest clinical report of children exhibiting behaviors currently identified as resembling ADHD was reported in 1798 by Scottish physician Alexander Crichton (Palmer & Finger, 2001). Crichton (1798) wrote a multi-book, multi-volume description of mental/behavioral health disorders observed in the late 18th century during his appointment as a physician at the Westminster Hospital. Among these early descriptions, Crichton highlights the profile of individuals with attention disorders. According to Crichton symptoms that denoted a disorder of attention were inattention, restlessness, and problems at school that developed at an early age.

The first presentation of ADHD symptoms by a psychiatrist can be found in an 1845 storybook of cautionary tales for children, written by German psychiatrist Heinrich Hoffmann (Thome & Jacobs, 2004). "The Story of Fidgety Philip" described a young boy whose hyperactivity at the dinner table led to him knocking dinner onto the floor, ruining the dining experience of his parents, and subsequently bringing shame and embarrassment upon himself (Hoffman, 1848, p. 18-20). Although the book was criticized for its depiction of harsh and gruesome consequences for misbehavior by children, it demonstrates Hoffmann's identification of children who exhibited behaviors currently identified as ADHD.

George F. Still is most commonly regarded as the first individual to identify what would today be considered ADHD-related behaviors (Barkley, 2006). Still (1902) presented a series of lectures on abnormal psychical conditions in children. During those seminal lectures, Still provided his audience with clinical observations of children's

behaviors that he conceptualized as marked by a defect in" inhibitory volition" and

"moral control". A focus of the lectures was Still's explanation of his belief that a child's

cognitive development included the acquisition of a degree of inhibitory volition.

Inhibitory volition, according to Still, involved the judgment of a child's reaction to an

environmental stimulus as appropriate when considering the stimulus and the child's age.

For instance, Still offered an example that involves the presentation and removal of a toy

to a two year-old child. If the child began crying hysterically, rolling around on the

ground, and pounding its fists, an observer may not be surprised. If the child was ten

years-old and displayed this same behavior, they may be said to lack inhibitory volition.

Still further postulated that *moral control* was closely related to inhibitory volition in that

volitional activities should be exercised with a particular degree of "moral

consciousness" that considers the good of others, along with oneself. Therefore, Still's

conceptualization of moral control involved an individual's capacity to behave in a

manner that considered another's good, along with their own. Moral control, according to

Still, depended on a child's age, environment, and the development of inhibitory volition.

Still's frustration with these cases was that the lack of moral control seemed independent

of intellectual disability and physical disease.

Among these children who were otherwise of average intelligence and had no

tissue disease of the brain or other organs, were several deficits in behavior including the

lack of behavior change based on punitive consequences, lack of sustained attention, and

improvement in behavior when the child was placed in a different environment. The lack

of behavior change based on consequences included cases where children were punished

for misbehaving, only to act in the same manner shortly thereafter. Still used several

examples to explain a lack of sustained attention. In one such example he told the story of

a child only attending to a game for a short period of time and not taking enough time to

put his shoes on to notice that they were on the wrong feet. Finally, Still noticed that

when some of these children were moved to a different environment, they behaved

differently. When placed in an institution or hospital setting where the child was exposed

to different stimuli, they behaved in a manner that demonstrated moral control similar to

that of a normally developing child. Still's descriptions could be recognized as early

observations of memory deficits, attentional difficulties, and the improvement of

behavior based on stimulus control and contingency management. Today, these factors

are all currently included when conceptualizing and treating ADHD-related behaviors.

Another important contribution to the historical account of the study of ADHD is

Wender's (1971; 1972) conceptualization of minimal brain dysfunction (MBD). Similar

to Still's (1902) observations, Wender was perplexed by children who behaved clumsily,

inattentively, and hyperactively, in the absence of tissue damage to the brain or other

physical abnormalities. Also similar to Still's observations, Wender's cases were

characterized by "an abnormality in arousal" that resulted in increased activity levels and

an inability to concentrate (p. 57). Wender's (1971) theory of MBD conceptualized the

disordered and hyperactive behavior of children across six constellations of criteria.

According to Wender (1971) children with MBD were likely to exhibit symptoms of 1)

hyperactivity and poor motor control, 2) lack of sustained attention and difficulty

concentrating, 3) academic and learning difficulties, 4) decreased inhibition exhibited as

a lack of impulse control, 5) conduct disorders and lack of a response to social demands,

and 6) lability of mood, including depression, anxiety, and diminished sensitivity to pain and punishment.

Wender (1971) utilized behavioral observations of MBD children to conclude that a child with MBD suffered from deficits in the ability to suspend immediate responses to stimuli in order to obtain future gratification. Essentially, Still and Wender offered similar topographical descriptions in their portrayals of children with difficulties in sustaining attention and controlling hyperactivity. The children depicted in each clinician's respective case studies could all be recognized by their similar behaviors. In addition, their overarching theories regarding the cause of the overt behavioral difficulties were also similar with regard to the role of inhibition (Barkley, 2006). Both Still and Wender emphasized a lack of, or deficient, inhibitory processes in children who exhibited poor attention and hyperactivity (Still, 1902; Wender, 1971).

Although the characteristic of hyperactivity pervaded the topographical descriptions of the early theories of ADHD, Virginia Douglas (1972) conceptualized the disorder as one marked primarily by the lack of sustained attention and poor impulse control, with or without hyperactivity. Douglas' (1972) work, and subsequent research studies and publications, offered significant advances in the understanding and differential diagnosis of ADHD, since hyperactivity as a symptom was apparent in several other psychiatric disorders (Barkley, 2006).

Appendix B

Defining ADHD as a Behavioral Disorder

Diagnostic criteria for a behavioral health disorder resembling what clinicians currently refer to as ADHD made its first appearance in the *Diagnostic and Statistical Manual of Mental Disorders, Second Edition* (DSM-II) as "Hyperkinetic Disorder of Early Childhood or Adolescence" (APA, 1968, p. 50). According to the criteria, children were considered hyperkinetic when they demonstrated overactivity, restlessness, lack of sustained attention, and distractability. The primary symptom of overactivity, or hyperkinesis, was unsurprisingly embedded in the name of the disorder. Prior to, and during the time of the printing of the DSM-II (APA, 1968), researchers and clinicians were interested in how the overt display of hyperactivity impaired a child's ability to behave appropriately in academic and social settings. A re-organization of the diagnostic criteria for ADHD in the *Diagnostic and Statistical Manual of Mental Disorders, Third Edition*, (DSM-III) conceptualized the disorder as one characterized primarily by attention deficits (APA, 1980). The DSM-III no longer highlighted hyperactivity as a vital symptom, lending the diagnosis the new title of "Attention Deficit Disorder (ADD)," and optional subtypes of with or without hyperactivity (APA, 1980, p.41-44). Seven years later the APA printed the *Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised,* (DSM-III-R) within which a change was made to the ADD diagnosis that reconsidered the role of hyperactivity in children and adolescents displaying attention deficits (APA, 1987). The diagnosis, with its new criteria which identified primary symptoms of inattention, impulsiveness, and hyperactivity, was titled "Attention Deficit Hyperactivity Disorder (ADHD)" (APA, 1987, p. 50). The diagnostic

title of behavioral disorders related to attention deficits and hyperactivity was yet again

revised in the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*

(DSM-IV) which took into account attention deficits with or without hyperactivity (APA,

1994).

Currently, the APA's (2000) criteria, found in the *Diagnostic and Statistical*

Manual of Mental Disorders, Fourth Edition-Text Revision (DSM-IV-TR) specifies

several criterion that must be displayed by a child to receive a diagnosis of ADHD. The

DSM-IV-TR (APA, 2000) requires a child to have displayed at least six symptoms of

inattention and/or at least six symptoms of hyperactivity-impulsivity, the presence of the

symptoms before the child was seven years-old, and impairment from the symptoms in at

least two settings. Furthermore, a diagnosis of ADHD is classified based on symptoms of

primarily combined inattention and hyperactivity-impulsivity, predominant

inattentiveness, and predominant hyperactivity-impulsivity (APA, 2000). The

predominantly inattentive subtype of ADHD (ADHD, Predominantly Inattentive Type) is

characterized by difficulties in sustained attention, failure recognize details in schoolwork

and other tasks, and avoids engagement in tasks that require attention. The predominantly

hyperactive-impulsive subtype of ADHD (ADHD, Predominantly Hyperactive-Impulsive

Type) is characterized by an excessively inappropriate amount of activity in an

environment despite the available stimuli. If certain aspects of the previously mentioned

criteria are not met, such as an individual suffering less than six symptoms of either

inattention or hyperactive-impulsive behaviors, an individual may receive the diagnosis

of ADHD-not otherwise specified (NOS) (APA, 2000, p.93).

ADHD is characterized by a continual pattern of behaviors that demonstrate inattentiveness which may present in isolation or in combination with hyperactive-impulsive behaviors (APA, 2000). The disorder typically manifests in early childhood where detection follows instances of children's disruptive behavior in elementary school that negatively impacts their academic and/or social functioning. Current conceptualization of the disorder is a result of over 100 years of inquiry into the behavior and etiology of children, and adults, who present with difficulties in attention and hyperactivity/impulsivity.

Appendix C

Establishing DSM Criteria for Adult ADHD

Barkley (2006) highlights several reasons for establishing clear diagnostic criteria for

adult ADHD:

> Beyond lost opportunities for appropriate treatment (or for staying free of
>
> treatment), inaccurate identification diminishes the credibility of the disorder itself.
>
> If individuals receive a diagnosis even though they do not meet criteria for it,
>
> skepticism about ADHD will quickly mount. Those who truly suffer from the
>
> disorder will not benefit from the serious consideration they deserve. (p. 429)

In light of these concerns Barkley (2006) established preliminary considerations for

assessing ADHD in adults:

> 1. Is there credible evidence that the patient experience ADHD-type symptoms in
>
> early childhood, and that at least by the middle school years, these led to substantial
>
> and chronic impairment across settings?
>
> 2. Is there credible evidence that ADHD-type symptoms currently cause the patient
>
> substantial and consistent impairment across settings?
>
> 3. Are there explanations other than ADHD that better account for the clinical
>
> picture?
>
> 4. For patients who meet criteria for ADHD, is there evidence for the existence of
>
> comorbid conditions? (p. 430)

> Barkley (2007) provided the field with a review report of his proposal for a DSM-

V category that specifies diagnostic criteria for ADHD symptoms that persist into

adulthood. In the report it is recommended that the DSM-V diagnosis of adult ADHD

specify approximately 7-9 criteria regarding deficits in behavioral inhibition and

executive functioning. Barkley's (2008) recommendations for DSM-V criteria for ADHD persisting into adulthood are displayed in the table below:

A. Has six (or more) of the following symptoms that have persisted for at least 6 months to a degree that is maladaptive and developmentally inappropriate:

1. Often is easily distracted by extraneous stimuli or irrelevant thoughts

2. Often makes decisions impulsively

3. Often has difficulty stopping activities or behaviors when he or she should do so

4. Often starts a project or task without reading or listening to directions carefully

5. Often shows poor follow-through on promises or commitments he or she may make to others

6. Often has trouble doing things in their proper order or sequence

7. Often is more likely to drive a motor vehicle much faster than others (excessive speeding) [Alternate symptom for those adults with no driving experience: Often has difficulty engaging in leisure activities or doing fun things quietly]

8. Often has difficulty sustaining attention in tasks or play activities

9. Often has difficulty organizing tasks and activities

B. Some symptoms that caused impairment were present in childhood to adolescence (before age 16 years).

C. Some impairment from the symptoms is present in two or more settings (e.g., work, educational activities, home life, community functioning, social relationships).

D. There must be clear evidence of clinically significant impairment in social, educational, domestic (dating, marriage or cohabiting, financial, driving, child-rearing, etc.), occupational, or community functioning.

E. The symptoms do not occur exclusively during the course of a Pervasive Developmental Disorder, Schizophrenia, or other Psychotic Disorder, and are not better accounted for by another mental disorder (e.g., Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder).

Coding note: For individuals who currently have symptoms that no longer meet full criteria, "in partial remission" should be specified.

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