Validity of an Executive Function Model of ADHD

Symptoms, Reading Difficulty and Substance Abuse in Adults

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The current study presents an integrated executive function model that explains the interrelationships among deficits in two executive functions (working memory and inhibition), ADHD symptoms, and two conditions (reading difficulty and substance abuse) that are commonly comorbid with ADHD in adulthood. The validity of the integrated model was tested using structural equation modeling with an adult sample consisting of consecutive referrals to a university-based research project. The final model suggested that working memory problems directly contribute to reading difficulty as well as to inattentive symptoms in adults. Direct contributions of inhibition to ADHD symptoms were not supported. However, ADHD symptoms had direct and indirect contributions to substance abuse symptoms. Current findings suggest the crucial role of working memory in the manifestation of ADHD symptoms and comorbid reading problems and also suggest ADHD symptoms' contribution to the development of adult substance abuse. These findings were interpreted as generally supporting the hypothesis of the developmental heterogeneity of executive function profiles associated with the manifestation of ADHD symptoms and comorbidities in adulthood.

Key words: ADHD, executive function, reading difficulty, substance abuse, working memory, inhibition

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Attention Deficit Hyperactivity Disorder (ADHD) is currently viewed as a chronic disorder, originating in childhood but with symptoms frequently continuing into adult life, causing distress and psychiatric comorbidities (Fischer, Barkley, Smallish, & Fletcher, 2005; Wasserstein, Wolfe, & LeFever, 2001). ADHD symptoms have been shown to persist into adulthood in 10 to 60% of cases with documented childhood onset (Mannuzza, Klein, Bessler, Malloy, & LaPadula, 1993; Weiss, Hechtman, Milroy, & Perlman, 1985). Also, those who continue to have the disorder as adolescents and adults have been found to be at greater risk for antisocial and substance abuse disorders as well as academic and vocational problems (Mannuzza et al., 1993; Satterfield & Schell, 1997). The diagnosis of ADHD in adults continues to be an area of controversy (Farone, Biederman, Feighner, & Monuteaux, 2000). It has been suggested that the way in which ADHD symptoms manifest may change over the course of development and, therefore, the application of childhood characteristics in the diagnosis of ADHD in adulthood may not be appropriate (Wender, Wolf, & Wasserstein, 2001). Related to potential differences in adulthood, Barkley (2006) reported that major complaints of adults seeking assessment for ADHD included difficulty with job placement and maintenance, inability to perform to capability, lack of organization, and low self esteem, as well as more typical complaints of forgetfulness and difficulty concentrating.

Increasing numbers of studies in the past decade have examined neuropsychological correlates of ADHD and found that children and adults with ADHD tend to perform more poorly than normal controls on various measures of neurocognitive functioning, especially those of executive function (EF). EF is generally defined as neurocognitive processes that adopt and maintain an appropriate problem solving set to attain a future goal (Welsh & Pennington, 1988). Given that EF is considered as an “umbrella” term for the complex cognitive processes that serve ongoing, goal-directed behaviors (Meltzer, 2007), many researchers have attempted to find if there are specific EF domains that are implicated in the manifestation of ADHD symptoms (Pennington & Ozonoff, 1996; Willcutt, Doyle, Nigg, Farahone, & Pennington, 2005). In this line of research, working memory and inhibition have received most theoretical and empirical attention in relation to ADHD and the role of working memory and inhibition in ADHD is well incorporated into the most comprehensive theoretical model of ADHD by Russell Barkley (Barkley, 1997, 2006).

According to Barkley (2006), the core deficit in ADHD lies in behavioral inhibition. Barkley (2006)’s disinhibition model further proposed that an inability to suppress prepotent responses to stimuli (i.e., disinhibition) interferes with the development and execution of other EFs such as