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Attention-deficit/Hyperactivity Disorder (ADHD), Learning Disabilities (LD), and executive functioning: Recommendations for future research

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ABSTRACT

This special issue of *Contemporary Educational Psychology* brings together multiple studies examining issues important to Attention-Deficit Hyperactivity Disorder, Learning Disabilities, and executive functioning difficulties. Drawing on these studies, I present five recommendations for future research in these areas: (1) develop specific criteria for identifying research participants; (2) provide more details about study participants and context; (3) expand the number of educational studies directly involving these students; (4) study more than just reading and mathematics; and (5) systematically investigate how to put research findings in these areas into practice.

1. Introduction

As a young child, I wondered if my teachers thought there was two of me. I was on the wrong side of trouble twice as often as anyone else, and I spent way more time in the Principal's office than any of my classmates.

At school, I couldn't settle in and down like those around me. Active, restless, and constantly in motion, teachers were uncertain about how to handle me or what to do with me. I, in turn, had no idea how to conform to the confines and constraints of the classroom, which required taming and controlling the overabundance of energy surging through me. From one report card to the next, across four different schools in four years, the lamentations were always the same: He can't sit still; he can't keep his hands to himself; he talks all of the time.

While an excess of energy provided ample opportunities for misadventures in the classroom, I came double-loaded for misbehavior. There often seemed to be no filter between what I was thinking and what I said or did. I would blurt out the first thing that came to mind, irritating the teacher and my peers. At other times, I impulsively engaged in behaviors that were risky, especially on the playground.

It might not come as a surprise that evaluations of my progress as a student were not promising. *Needs Improvement* and *Unsatisfactory* were concepts I came to know quite well.

This all occurred in a less complicated time, when terms such as Attention-deficit Hyperactivity Disorder (ADHD) or Learning Disabilities (LD) did not exist. Behaviorism was in its heyday, and psychologists primarily focused on antecedents and consequences to explain children's behaviors. If an expert had been called in to discuss my classroom challenges, constructs such as executive functioning or self-regulation would not be evoked, even though the distinction between automatic and controlled cognitive processes had been put forward by Donald Broadbent in the 1940s (see Shiffrin & Schneider, 1977). Instead, my teachers, my family, and I were pretty much on our own to figure out if I had behavioral problems, learning difficulties, or both.

It turns out that ADHD probably provided the best explanation for my early tribulations in school. When I entered fifth grade, I had a teacher that constructed a highly active classroom, and engaged students in academic games that involved quick decisions. I found my wings, and had the highest grade point average in school that year. From that point forward, I became a good, but not outstanding student (strong academic success did not occur until graduate school). Over the years, I gained control of my impulsivity (or at least I like to think so), but the high octane energy level never abandoned me. Once it was tamed, it became my greatest asset.

2. Advances in research on ADHD, LD, and executive functioning

When the editors of this special issue of *Contemporary Educational Psychology* asked me to write a Commentary, they had no idea that I was so directly familiar with the challenges of ADHD and school success (my daughter also has ADHD). Rather, they knew that I had been involved in the field of learning disabilities,

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as a teacher and later as a researcher. My early challenges and my chosen vocation over more than 40 years provides me with a somewhat unique vantage point for thinking about the advances and challenges involving ADHD, LD, and executive functioning. I exploit these experiences in my commentary here.

The ADHD classification is used to describe "children and adults presenting with significant problems with attention, and typically with impulsiveness and excessive activity as well" (Barkley, 2015, p. 3). The history of ADHD as a concept spans more than 200 years (Barkley & Peters, 2012), and since World War II has been associated with various syndromes including minimal brain damage, hyperkinetic impulse disorder, and hyperactivity. The primary emphasis in these earlier classifications focused on hyperactivity. With the publication of the third edition of *Diagnostic and Statistical Manual* (*DSM III*; American Psychiatric Association, 1980), more emphasis was placed on inattention and impulsivity, resulting in a classification of ADD with or without hyperactivity. A further revision of the *DSM III* (American Psychiatric Association, 1987) resulted in the term ADHD, identifying it as a disruptive behavior disorder, along with Oppositional Defiant Disorder and Conduct Disorder. The fifth edition of the *DSM* (American Psychiatric Association, 2013) made additional changes in the construct, specifying that an ADHD diagnosis can involve inattention, hyperactivity/impulsiveness, or both. Current classification also emphasizes that symptoms for ADHD must occur by 12 years of age, occur to a degree that is developmentally deviant, and endure for at least 6 months.

The LD classification is used to describe a presumed neurological disorder that impacts the ability of the brain to receive, process, store, and respond to information (Wong, 2004). Historically, LD has been used to describe a person of normal or above normal intelligence who experiences difficulties in acquiring basic academic and functional skills. Not dissimilar from ADHD, the genesis of the LD term is relatively recent, dating to Samuel Kirk's use of the term in 1963 at a conference for parents and educators (Pullen, Lane, Ashworth, & Lovelace, 2011), but its initial conceptualization and refinement can be traced back to the beginning of the last century and involved syndromes ranging from word blindness to brain injury to minimal brain dysfunction to perceptual handicaps (Mercer, 1987). Since the first use of the LD label, numerous definitions have been put forward, and like ADHD, conceptualizations of the construct are still evolving. For example, the frequently used IQ-discrepancy model (i.e., a LD is present if there is a significant discrepancy between observed academic performance and expected academic performance based on intelligence) is now challenged by supporters of the Response-to-Intervention model which is designed to rule out poor instruction as the cause of learning problems (Fletcher, Morris, & Lyon, 2003).

While the construct of executive functioning is a more recent development, it has become clear that those with ADHD and LD are likely to experience executive functioning difficulties (Swanson, 2013; Swanson, Harris, & Graham, 2003; Weyandt & Gundmundsdottir, 2015). As with ADHD and LD, there is general agreement on the notion of executive functioning, but it is defined and operationalized in different ways. I agree with Jacob and Parkinson (2015) that it is comprised of separate components, which include attentional processes, working memory, and executive control. Students with ADHD or LD may experience difficulty with any or all of the aspects of executive functioning, resulting in significant challenges at school and in everyday life, as each of these components are essential to behavioral control and academic success. In addition to being a central feature of ADHD and LD, children without either of these conditions can experience executive function disorders, involving problems with planning, organizing, strategizing, remembering details, and managing time and space (see www.ncld.org/types-learning-disabilities/executive-function-disorders).

Since my initial challenges with schooling in the mid to late 1950s, incredible strides have been made in our understanding of why some children find school so difficult (see Barkley, 2015; Swanson et al., 2003, 2013). Constructs such as ADHD and LD were put forward to explain such difficulties and refined through the lens of new theories, research, and practice. Advances were made in understanding the etiology, symptoms, subtypes, and prevalence of both conditions. This included a better understanding of the role of executive functioning in ADHD and LD as well as the role of other constructs such as language, motivation, and memory. Methods for identifying and diagnosing each condition were developed, tested, modified, and sometimes abandoned. Different treatments for addressing the challenges of children and youngsters with ADHD and LD were created and tested scientifically, with some found wanting and others providing promising results. Researchers and writers (see for example Hallowell & Ratey, 1994) explored the continuing role and impact of both of these conditions in adult life. Increasingly, research using neuroimaging, studies involving heredity and genes, and investigations examining environmental factors have expanded our understanding of the genesis and operation of AHDH and LD. Perhaps just as importantly from a practical stand point, new laws and judicial rulings made an appropriate education a fundamental right of these students in countries like the United States.

If I began school today, instead of coming of age in the 1950s and 60s, my teachers and parents would be better prepared to address my misadventures at school, whether they involved ADHD, LD, or executive functioning. The knowledge acquired during the last 50 years or so would benefit me in another way too. Going forward, I would possess one or more frameworks for interpreting and understanding my actions in and outside of school, providing a potential platform for self-awareness and personal change.

3. The special issue

The special issue of *Contemporary Educational Psychology* pulled together and edited by Andrew Martin, Rayne Sperling, and Kristie Newton provides an excellent example of the advances made by researchers in ADHD, LD, and executive functioning today. The studies primarily focus on academic difficulties in reading and mathematics. Some of them are longitudinal. Many of the studies examine motivational issues (an often understudied construct with these populations). Most of the investigations attempt to identify potential correlates of academic success and failure. Several investigators examine the effectiveness of specific interventions. These studies replicate findings obtained by prior researchers (an essential element of the scientific process) and forge new ground.

In a nut shell, we learn that academic red shirting of children with ADHD is not associated with better outcomes in reading and mathematics, although there are individual differences in this general finding depending on whether students were or were not medicated (Barnard-Brak, Stevens, & Albright). We further learn that early difficulties in kindergarten with executive functioning (especially working memory) increase children's risk of experiencing reading and mathematics difficulties in grade one, after first controlling for potential confounds like prior reading and mathematics difficulties (Morgan, Li, Farkas, Cook, Pun, & Hillemeier). Another measure of executive functioning, cognitive flexibility, also predicts students' subsequent academic performance in this same study, as well as another study involving children in first and second grade. This second investigation, reports that students with reading comprehension difficulties score lower on a reading specific cognitive flexibility measure than their typically developing counterparts, even after variance due to decoding, vocabulary,