Researching Autism Spectrum Disorder in the Workplace: Lessons Learned from Researching the Relationship between Adult Attention Deficit Disorder and Organizational Behavior

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Recent research suggests that many neurobehavioral disorders (NBDs) remain prevalent through adolescence and into adulthood. Research also suggests that NBDs significantly influence the performance of many adult workers. As the recognition and definition of adult NBDs evolves, there is an accompanying need for research on the relationship between NBDs and organizational behavior and performance. Research on autism spectrum disorder (ASD) is in its infancy and guidelines are needed to help address the complex challenges of researching the relationship between an adult NBD like ASD and organizational behavior. Recent research on ASD suggests a continuity relationship between ASD and AADD, with AADD being a less severe version of ASD. The relative longer history and greater volume of research regarding AADD in the workplace suggests that a review of this research may help provide a useful roadmap for examining the influence of ASD. This study reviews research on the relationship between AADD and organizational behavior, identifies key research issues, empirically addresses some of the key controversies, and provides an example of empirically examining the relationship between NBD symptom clusters (in this case AAD) and an apex organizational behavior variable (role stress). The results help provide strategic guidelines for researching ASD in the workplace.

Research on neurobehavioral disorders (NBDs) suggests that many disorders like Attention Deficit Disorder (ADD) and Autism Spectrum Disorder (ASD) remain prevalent through adolescence and into adulthood (Faraone & Biederman, 2005; Sizoo, van der Gaag, & van den Brink, 2015). Recent reviews of global prevalence research estimate that at least 5% of the global adult population have clinical levels of attention-related disorders (Polanczyk et al., 2007) costing the global economy approximately 144 million days of lost production per annum (de Graaf et al., 2008). This suggests that NBDs like AAD and ASD are prevalent and impactful within the global economy.

The strengthening of legal protections for workers with mental disabilities and a growing emphasis on proactive diversity management, inclusion and corporate social responsibility has increased the pressure on employers to accommodate and actively engage workers with neurobehavioral disorders (NBD). Such an orientation requires an understanding of both the challenges and benefits of NBDs. For example, empirical research has only recently confirmed a relationship between ADD and creative ability in the workplace (White & Shah, 2006, 2011).

Despite the prevalence and impact of NBDs in the workplace, relatively little research has been conducted on the impact of NBDs within the nomological network that determines individual and team performance in organizations (Halbesleben, Wheeler, & Shanine, 2013). This lack of research limits managerial capacity to provide support, accommodation, and to ensure the effective inclusion of disordered but potentially valuable employees.

Research on the impact of ASD on work behavior is in its infancy and some guidelines are needed to help address the complex challenges that arise when researching the relationship between a NBD and organizational behavior. The potential continuity relationship between ASD and AAD suggests that most key issues from symptom identification and measurement, constructing models and hypotheses, data collection and analysis, and making recommendations, are likely to possess similarities. The relative longer history and greater volume of research regarding AAD in the workplace suggests that a review of this research may help provide a roadmap for examining the influence of ASD. This study reviews research on the relationship between AAD and organizational behavior, identifies key research issues, empirically addresses some of the key controversies, and provides an example of empirically examining the relationship between NBD symptom clusters (in this case AAD) and an apex organizational behavior variable (role stress). This should provide some strategic guidelines for researching the ASD in the workplace.

Definition, Prevalence and Impact of Adult Attention Deficit Disorders

The most commonly diagnosed attention disorder is Attention Deficit-Hyperactivity/Impulsivity Disorder. The diagnostic and statistical manual of mental disorders (DSM-5, 2013) produced by the American Psychiatric Association (APA) defines this disorder as a persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with development, has symptoms presenting in two or more settings (e.g., at home, school, or work), and negatively impacts social, academic or occupational functioning. A clinical diagnosis requires children to demonstrate

at least six symptoms from either the inattention symptoms (inattention sub-type), the hyperactivity-impulsivity symptoms (hyperactive/impulsive sub-type) or both (combined type), whereas adolescents and adults must exhibit at least five.

Lifespan research suggests that the majority of children will continue to experience symptoms as adults, and a recent population screen of 966 adults suggests prevalence of approximately 3% using a narrow definition and 16% using a broader definition (Faraone & Biederman, 2005). Prevalence research suggests that at least 11 million adults within the United States and over 200 million globally possess clinical levels of ADHD (Barkley, Murphy, & Fischer, 2010; de Graaf et al., 2008; Polanczyk et al., 2007). Total annual incremental costs of adult attention related disorders in the United States are estimated at over $200 billion with income and productivity losses of over $100 billion (Jalpa et al., 2012). Research to date suggests that Adult Attention Deficit Disorders are a common and costly problem within both the global and US workforce (Jalpa et al., 2012; de Graaf et al., 2008; Kessler et al., 2005). In addition, prevalence may be significantly underestimated due to poor coverage of symptoms within existing measures, incorrect clinical thresholds, lack of self-awareness and negative social stigma that creates under reporting, and complex coping mechanisms that concentrate impairment in one particular life situation while protecting other situations (Brown, 1996, 2001; Barkley, 2010; Goldstein, 2002; Manor et al., 2012; Palmini, 2008).

Research on symptom prevalence through adolescence and into adulthood suggests a continuation of symptoms accompanied by a general decline in symptom intensity and a relatively greater decline or absence of the hyperactivity component of the disorder (Biederman et al., 2006; Brown, 1995). Brown (1995) suggests that strict reference to the symptoms of inattention contained within the diagnostic and statistical manual of mental disorders (American Psychiatric Association-DSM-V, 2013) does not capture all of the key adult symptoms, and that the hyperactivity component should be excluded from the adult construct.

Research conducted by Brown (1996) on symptoms that commonly occur among adults with attention deficits produced the following 5 symptom clusters (factors):

- difficulty activating and organizing to work (difficulty getting organized and started on tasks predominantly caused by a relative higher arousal threshold and/or chronic anxiety)
- difficulty sustaining attention and concentration (difficulties staying focused on priority tasks that are not of high personal interest, receiving and organizing information and resisting distraction)
- difficulty sustaining energy and effort (insufficient and/or inconsistent levels of general energy and difficulty sustaining effort required to complete important tasks)
- difficulty managing emotional interference (difficulty with intense, negative and disruptive mood states; relatively high and sustained levels of irritability and emotional reactivity; difficulty managing emotions that constrain the development of constructive relationships)
- difficulty utilizing working memory and accessing/recalling learned material (episodic or consistent chronic forgetfulness, difficulty organizing, sequencing and retaining information in short term memory, and problems accessing and using learned material)

Categorical vs Dimensional Measurement

Researchers and practitioners have expressed concern about a simplistic interpretation and use of the attention disorder construct arising from categorical diagnosis based on the presence (or lack thereof) of a particular number and type of symptoms. The categorical approach both ignores evidence that symptoms and associated impairment fall along a continuum (Achenbach, 1991; Blacker & Tsuang, 1992; Levy et al., 1997; Sherman, Iacono, & McGue, 1997), and exclude non-clinically disordered adults from full consideration within research on nomological networks of interest (Nigg, 2006). Limitations of the categorical approach within organizational behavior research is addressed by using dimensional measurement and correlation analysis when modeling the disorder within individual and team performance networks (Coetzer & Trimble, 2010).

Brown (1996) uses dimensional (severity) measurement of the symptom clusters to determine the overall level of AAD. AAD is defined as a persistent pattern of inattention and related cognitive, emotional and effort-related symptoms that occur with varying levels of severity and create progressively greater challenges within the personal, academic, and work life of adults as severity increases (Brown, 199; Coetzer & Trimble, 2010). Research by Coetzer (2007, 2009a, 2009b, 2009c) demonstrates that dimensional measurement and correlation of AAD with organizational behavior variables reveals important components of the individual and team performance nomological network.

Occupational and Organizational Impact

Research by Biederman et al. (2006) found that, on average, disordered adults have household incomes that are $10,791 lower for high school graduates and $4,334 lower for college graduates. Annual income loss for disordered adults in the United States is similar to losses associated with drug and alcohol abuse (Biederman et al., 2006).

Organizational behavior research has associated disordered adults with poor interview performance (Weiss & Hechtman, 1993), higher workplace accident rates (Reynolds, 1997), lower job performance ratings (Barkley, 2013), higher absenteeism (Secnik, Swensen, & Lage, 2005), lower productivity (Kessler et al., 2009) and higher turnover (Kleinman et al., 2009). Disordered adults are also perceived by their employers as requiring more supervision and less able to complete assignments (Barkley, 1990). They are also more likely to change jobs (Reynolds, 1996), engage in part time employment (Biederman et al., 2006), and seek out jobs that don't require repetitive tasks, close supervision, sedentary performance conditions and concentration over long periods of time (Mannuzza et al., 1993). A review of data from Fortune 200 companies found that medical costs for clinically disordered employees were 48% higher (Secnik et al., 2005).

Research studies using dimensional measurement of AAD have identified associations between difficulty with teamwork (Coetzer & Richmond, 2007; Coetzer & Trimble, 2010), greater reliance on coworkers, difficulty managing conflict, job stress (Coetzer, Hanson, & Trimble, 2009), lower self-efficacy, and less effective task management systems (Coetzer & Richmond, 2009).

General Theories of Adult Attention Disorders and Work Performance Constraints

Work performance deficits associated with Adult Attention Deficit Disorders have recently been explained using Attention Control Theory (ACT) which proposes that any conditions that create inattention disrupt the efficient and effective performance of priority tasks (Eysenck et al., 2007). The efficient and effective achievement of goals is thought to be influenced by two interdependent attentional systems – the stimulus driven system and the goal driven system (Corbetta & Schulman, 2002; Posner & Peterson, 1990). The stimulus driven system responds to external stimuli that make immediate demands on attention and the goal driven system uses higher order cognitive processes and control systems to keep individuals progressing toward broader goals (Miller & Cohen, 2001).

Disordered employees are thought to have both an imbalance between their attentional systems, and difficulty making optimal use of the goal driven system (Halbesleben et al., 2013). The imbalance is the result of disproportionate expenditure of attentional resources on external stimuli that are immediately gratifying and often task irrelevant or non-critical. Sub-optimal use of the goal driven system is caused by limited ability to inhibit initial responses, higher vulnerability to distraction and disrupted control of working memory (Alvarez & Emory, 2006). This prevents optimal development and use of higher order cognitive processes like planning, prioritizing, modeling and predicting, decision making, problem solving and regulation of both emotion and effort (Barkley, 1997).

Impulsivity and over activity associated with the disorder also makes it difficult for individuals to participate in meetings and to collaborate and coordinate with others on tasks that are not of personal interest and immediately gratifying (Jackson & Farrugia, 1997; Kitchen, 2006; Patton, 2009). ACT suggests that disordered employees will have a relatively lower ability to translate effort into efficient and effective performance on priority tasks because of higher distractibility, diffuse expenditure of energy, disrupted workplace relationships, and constrained higher order cognitive processes (Halbesleben et al., 2013).

Disordered adults may have a relatively greater propensity for Organizational Citizenship Behavior (OCB) which offers more immediate gratification but often comes at the expense of priority work tasks (Halbesleben et al., 2013). This suggests that both the disordered employee and some coworkers who benefit from the OCB may have a positive perspective of performance while others who are impacted by poor performance on priority tasks will often have the opposite experience.

Contributions to Performance

Attention disorders are also associated with positive behaviors like ingenuity, innovation, creativity, determination, perseverance, risk taking, and intense concentration on things of interest (Mannuzza et al.,1993; Schecklmann et al., 2008; Nicolaou et al., 2011; White & Shah, 2006, 2011) which may explain why entrepreneurs appear to have relatively higher levels of the disorder (Laporto, 2005; Nicolaou et al.,

2011; Nixdorff, 2008; Miller, 1993). Notable modern entrepreneurs who acknowledge that aspects of the disorder have been useful to them include Richard Branson (founder of Virgin), Ingvar Kamprad (founder of Ikea), David Neeleman (founder of JetBlue), Charles Schwab (founder of the Schwab Corporation) and Paul Orfalea (founder of Kinkos). Hartmann (2003) suggests that significant historical figures like Thomas Edison, Albert Einstein, Henry Ford, Walt Disney and many others demonstrated the symptoms of Attention Deficit Related Disorders and took advantage of some of the benefits like perseverance, hyper focus and creativity. Research by White and Shah (2011) suggests that adults with ADHD attain higher overall levels of creative achievement across a variety of occupational and task domains. In fast paced work environments, adults with ADHD may perform just as well, if not better, than non-ADHD employees (Stuart, 1992).

The attention deficit characteristic of low arousability is thought to produce a higher sensation seeking drive which generates higher levels of risk taking and novelty/stimulation seeking behavior (Farley, 1985). This component of the disorder received additional validation when a cognitive restlessness symptom cluster loaded onto the hyperactivity factor within the Conners Adult ADHD Scale (CAARS) (Conners, Erhardt, & Sparrow, 1999). Subsequent research by Sagvolden et al. (2005) suggests that the maintenance of novel behavior is associated with reduced reinforcement and extinction opportunities caused by the disorder.

Higher levels of creativity associated with the disorder are thought to be the result of uninhibited attention spans (wider and more diffused) and increased protection from both internal and external inhibitors. Widened and defocused attention adds more elements to the attentional stream which increases the number of potential combinations (Mendelsohn, 1976). Protection from external inhibitors is caused by high distractibility that prevents disordered adults from focusing on immediate external constraints (Memmert, 2009). Protection from internal inhibitors is caused by disrupted links between working and long term memory that reduces the influence of previously developed and stored schema (Park et al., 2003).

Translating creativity into practical benefit requires both divergent thinking and the ability to focus attention and work within certain constraints (Finke & Bettle, 1996; Finke, Ward, & Smith, 1992). Research conducted by White and Shah (2011) suggests that disordered adults have a significantly greater preference for the idea generation stage of decision making and problem solving which requires divergent thinking. They have significantly lower preference for defining the decision making situation or developing and refining ideas and solutions, all of which predominantly require convergent thinking and active consideration of constraints. Disordered and non-disordered adults appear to have similar preferences regarding the implementation stage of decision making.

Recent research by Zhou (2003) suggests that employees with low creativity benefit from working closely with highly creative employees. This suggests that one of the key contributors to raising levels of creativity and innovation in organizations is the manner in which highly creative and potentially disordered employees are distributed and deployed throughout the organization. Kessler et al. (2005) summarizes this situation by suggesting that disordered employees need to be

placed in performance situations that are aligned with their strengths and supported to remove, reduce or mitigate the deficits which can be a significant constraint on performance. Hartmann (1993, 2003) suggests that certain features of AADD may be necessary for organizational and societal success, and encourages employers to take a more encompassing view of disordered employees.

Treatment and Management of Adult Attention Disorders

Adult Attention Deficit Disorders are highly treatable (Barkley, 2010; Shaw et al., 2012) but also challenging because of a complex etiological structure with multiple points of intervention and variation within the form of the disorder (Barkley, 2010; Brown & Gerbarg, 2012; Chacko, Kofler, & Jarrett, 2014). Treatments are typically divided into medicinal correction of a neurostransmitter imbalance and non-medicinal activities that address related cognitive, emotional and behavioral deficits, and create or secure corrective or supportive environments (Hodgson, Hutchinson, & Denson, 2014; Sibley et al., 2014).

Non-medicinal treatment includes education, neurofeedback, various forms of counseling, coaching and training (cognitive-behavioral, experiential, systemic), and behavioral and compensatory management (person-situation fit and accommodation) (Hodgson et al., 2014; Sibley et al., 2014). Research suggests that other factors like exercise, nutrition and meditation may also contribute to effective management of the disorder (Stevens et al., 2011; Zeidan, 2010). Most researchers and clinicians agree that multimodal management of the disorder involving a combination of medicinal and non-medicinal interventions has the greatest potential for success (Shaw et al., 2012; Travell & Visser, 2006).

Adult Attention Disorders in Contemporary Organizations

Rapid changes in social and economic conditions brought about by technological advances, globalization, human migration and other factors are changing the nature of work and how organizations are designed and managed (Dastmalchian & Blyton, 2001; Davis-Blake & Broschak, 2009). Organizations are moving from management driven external control to more concurrent control by increasingly empowered, self-regulating and comanaging employees working in teams (Freese, 2008). This change is delegating and distributing increasingly complex responsibilities and associated competencies throughout the organization which employees are expected to embrace, develop and enact in an increasingly independent manner (Manz et al., 2015). Many of these competencies rely on higher order cognitive processes like inhibiting initial responses, planning, prioritizing, critical thinking, modeling, prediction, regulation of emotion, regulation of effort and problem solving. The emphasis on collaboration and working in heterogeneous teams has increased the general importance of emotional regulation and social skills.

The disruption of higher order cognitive processes and the social challenges created by the disorder are potential constraints on the ability to develop and enact many contemporary workplace competencies. The increasing cognitive and emotional

load occurring within many workplace roles places additional demands on higher order cognitive processes. This may further tax already stretched cognitive resources resulting in amplification of symptoms and additional constraints on performance (Young et al., 2007).

Other highly valued competencies like creativity, innovation and an entre/intrapreneurial orientation appear to be enhanced by the disorder. The ability of an organization to design managerial strategies that foster employee innovativeness, creativity and an entre/intrapreneurial orientation may be one of the most significant contributors to sustained organizational success within an increasingly globalized economy (Meisinger, 2007; Tewari, 2011). This suggests that some of the most highly valued employees may also be disordered to varying degrees and that complex and supportive managerial strategies may be required to successfully deploy these employees.

The development of multi-modal management of the disorder in the workplace requires a comprehensive understanding of the impact of the disorder on personal performance capacity (core workplace competencies, motivation and other performance supporting personal states), performance behavior including key mediators and moderators, and performance outcomes at the individual, team, and organizational level (Coetzer & Trimble, 2010). Recent research suggesting that the relationship between genetic risk factors and manifest symptoms may be activated and/or strengthened by negative psychosocial conditions (Nikolas, Klump, & Burt, 2012) highlights the potential importance of developing constructive relational, team, and organizational cultures/climates for at risk employees.

Operationalization and Measurement – DSM-Based Adult Attention Deficit Hyperactivity-Impulsivity Disorder vs. Adult Attention Deficit Disorder

The DSM determination of clinical status requires reaching a symptom quantity threshold and demonstrating significant impairment in two or more life settings (social, academic etc.). Both practitioners and researchers have expressed concerns about using a categorical diagnosis derived from a symptom count and making subjective assessments of related impairment. They suggest that treating the disorder as a categorical diagnosis as opposed to a dimensional construct with varying levels of severity promotes simplistic use and interpretation of the construct (Achenbach, 1991; Blacker & Tsuang, 1992; Brown, 1996, 2001; Levy et al., 1997; Nigg, 2006). The DSM-5 (2013) has acknowledged the need for more dimensional treatment of ADHD by suggesting that clinically disordered persons be classified as mild, moderate, or severe. Expanding social and legal support for inclusion and reasonable accommodation of disordered but functional employees has increased the need for more objective determinations of significant impairment.

Alternatives to the use of a symptom count and subject assessment of impairment includes dimensional measurement of symptoms and use of standard deviation from a normative mean to determine clinical levels of impairment. Scales used for dimensional measurement have been developed by selecting items that best represent manifest symptoms and factor analyzing the item set to determine dimensionality and

factor loadings. Scales are typically made ready for use by selecting and confirming the optimal factor structure and related items, including the determination of subtype, and norming the instrument. Clinical status is determined by examining a subject score relative to a clinical cut point that is set at a particular standard deviation above the normative mean (typically between 1.5 and 2 standard deviation). The content validity of these instruments is primarily dependent on the domain coverage and quality of the original set of items submitted for instrument validation.

Use of either continuous or categorical (clinical status) data from these instruments in subsequent research on antecedents and consequences depends on perspectives about normal versus abnormal and the purpose of the research. Nigg (2006) suggests that disorders are predominantly a clinical manifestation of personality with shared determinants and that normal and abnormal are different points along the same continuum. Clinical cut-points therefore represent an estimation of the general point along the continuum where increasing severity of symptoms becomes significantly impairing, rather than a qualitatively different phenomena or category. The continuum perspective supports correlating symptom intensity or frequency with variables contained within a nomological network of interest.

Determining the content validity and dimensionality of new forms of a disorder like adult ADHD is necessary in order to identify any important differences. The DSM description of the disorder and its subtypes has predominantly evolved out of practitioner experiences and research with children (Weiss & Hechtman, 1993; Wender, 1995). Reference to adult ADHD in the DSM began with the specification of a symptom threshold for adults and the description of workplace difficulties within the listed symptoms (Lange et al., 2010). The DSM-5 (2013) added impairment in occupational functioning to the formal definition of the disorder and expanded the descriptions of how the symptoms might appear in adults. The specification of a lower symptom threshold for adults suggests that adult ADHD may be a somewhat different form of the disorder. The lower symptom threshold recognizes the continuing evolution of the disorder across the age span of adolescents and adults often resulting in fewer manifest symptoms, but continuing impairment (Barkley, 2010).

Research conducted on the symptom domains of adult ADHD by Conners et al. (1999) produced 4 factor-derived dimensions. These include an inattention/memory factor and a hyperactivity factor that includes both physical and cognitive restlessness. The impulsivity factor includes the traditional elements of blurtaciousness (excessive talking and social intrusiveness), plus items that represent emotional liability or instability. The final factor refers to self-concept and includes items related to low self-esteem, low self-efficacy, and failure to confront challenges. The self-concept factor is thought to emerge as a result of the accumulated effects of living with the challenges of the disorder through childhood and into adulthood.

The items within the Conners et al. (1999) inattention/memory factor are similar to the DSM inattention symptoms except for items that refer to trouble getting started and managing time. The Conners hyperactivity factor includes items that refer to both physical and cognitive restlessness. The physical restlessness items are similar to the hyperactivity symptoms in the DSM, whereas the cognitive restlessness items are not represented in the DSM symptoms. The cognitive restlessness items are similar

to the exploratory excitability subscale within Cloninger's (1988) novelty seeking dimension of personality. The Conners impulsivity factor includes blurtaciousness and social intrusiveness items that are similar to the DSM impulsivity symptoms, but also includes items that refer to emotional reactivity and instability that are not represented in the DSM symptoms.

Research on self-reported symptoms through adolescence and adulthood suggests a general decline in symptom intensity with a relatively greater decline in hyperactivity-impulsivity (Brown, 1995; Gittelman et al., 1985; Weiss & Hectman, 1993). Brown (1995) suggests that the hyperactivity component should be excluded and that strict reference to the symptoms of inattention in the DSM may not capture all of the key adult symptoms. Research conducted by Brown (1996) on symptoms that commonly occur among adults with attention deficits produced 5 factor-derived symptom clusters. These 5 factors include difficulties with getting ready to work, concentration, effort and energy, emotional interference, and working memory. Brown (1995, 1996) suggests that Adult Attention Deficit (AAD), as opposed to adult ADHD (AADHD) may be a more prevalent problem for adult workers and that some of the key symptoms associated with the disorder may have been ignored in previous research. Adult Attention Deficit (AAD) is defined as a persistent pattern of inattention and related cognitive, emotional, and effort-related symptoms that occur with varying levels of severity and create progressively greater challenges within the personal, academic, and work life of adults as severity increases.

The Brown symptom clusters that represent difficulty organizing/activating to work and difficulty sustaining attention/concentration are a more extensive and multi-dimensional representation of similar items in both the Conners inattention factor and the DSM list of inattention symptoms. Difficulties sustaining energy and effort are not well represented in either the Conners factors or the DSM symptoms but are supported by the state regulation theory of attention disorders (Sanders & Van Duren, 1998) and associated research (Metin et al., 2014). Research on required effort has identified additional effort needed to correctly inhibit a response (Vaidya et al., 1998), additional effort required to complete tasks in the midst of various cognitive constraints (Sáez-Francàs et al., 2012), and the excessive use of energy required to maintain complex coping mechanisms (Palmini, 2008).

The Brown symptom cluster that represents difficulties with emotional interference is a more extensive representation of the emotional liability component of the Conners impulsivity factor which is not represented within the DSM symptoms. Research suggests that the disorder is associated with lower emotional recognition (Kats-Gold, Besser, & Priel, 2007; Ludlow, 2014), higher emotional intensity (Skirrow et al., 2014), hyper-emotional responsiveness (emotional reactivity) involving both positive emotions (e.g., happiness/exuberance) and negative emotions (e.g., frustration/anger) (Brown, 2014; Sjöwall et al., 2013), and greater difficulty regulating emotions (Barkley, 2005; Berlin et al., 2004; Parker et al., 2002; Pisecco et al., 2001; Sjöwall et al., 2013). Research by Sjöwall et al. (2013) suggests that emotional liability contributes independently to symptoms. The Brown symptom cluster representing difficulties with working memory is a more extensive representation of similar items in both the Conners inattention factor and the DSM inattention symptoms that reference forgetfulness.

This research makes use of both the Brown Attention Deficit Disorder Scale (BADDS) that measures the 5 symptom clusters identified by Brown (1995, 1996, 2001), and a part of the CAARS that measures DSM-based hyperactivity (Conners et al., 1999). Use of the BADDS provides a more comprehensive coverage of the adult symptom clusters identified by Conners et al. (1999), Brown (1995, 1996), and the inattention symptoms listed in the DSM. The BADDS does not include measures of DSM hyperactivity (physical restlessness), DSM impulsivity (blurtaciousness, excessive talking and intrusiveness), or the cognitive restlessness cluster contained within the Connors hyperactivity factor. A measure of hyperactivity-impulsivity that directly corresponds with DSM criteria was taken from the CAARS-Screening Version to provide more comprehensive coverage of the symptom clusters, and provide a way of testing differences between AAD and DSM based hyperactivity-impulsivity.

The content and dimensionality of both the general and adult-specific construct requires further clarification including an examination of potentially positive symptoms like creativity, and other symptoms that may contribute to an entre/intrapreneurial orientation (Mannuzza et al., 1993; Nicolaou et al., 2011; White & Shah, 2006, 2011). The appearance of the cognitive restlessness symptom cluster within the Connors hyperactivity factor suggests a link with exploratory excitability and novelty seeking which may help to explain a suspected association between the disorder and entrepreneurial cognition and behavior (Nixdorff, 2008).

Clarifying both the positive and negative impact of the disorder within the nomological network that determines individual and team performance in the workplace is required in order to develop effective multimodal management of the disorder in the workplace. This study helps to address the research gap by conducting an empirical examination of the relationship between AAD and role stress, a key mediator of individual performance in the workplace (Coetzer & Richmond, 2009).

Role Stress

Research suggests that a significant proportion of the US labor force experiences high levels of stress at work (Gallie & Zhou, 2013; Gorman & Kmec, 2007) which often produces detrimental consequences for both individuals and organizations (Ortqvist & Wincent, 2006). The annual economic cost of work-related stress in the United States is estimated to be between $200 and $300 billion (Sulsky & Smith, 2005). Role stress is defined as "a perception of a role indicated by ambiguity, conflict and overload arising from both the characteristics of the individual and the work environment" (Tetrick, 1992, p. 136). Role ambiguity occurs when a person is not sure what their role requires and/or how to do it (Cooper & Dewe, 2004), whereas role conflict occurs when the performance requirements of a role are not compatible (Shenkar & Ziera, 1992). Role overload is defined as having too many things to do within a given period of time (Peterson & Smith, 1995). Role stress is an apex variable within the nomological network that determines individual performance in the workplace because it mediates the opportunity of translating effort and skill into role performance (Coetzer et al., 2009).

Moderate levels of stress referred to as eustress is thought to encourage

performance whereas high levels of stress referred to as distress is considered to be disruptive (Selye, 1976). Bhagat et al. (1985) suggest that some workplace stressors are positive because they "produce a state of challenge, coupled with disruptive pleasure" (p. 203). Recent research has distinguished between challenge stressors that facilitate goal achievement and personal growth, and hindrance stressors that threaten goal achievement (Cavanaugh et al., 2000). Challenge stressors include workload, time pressure and responsibility that evokes a sense of challenge and increases the perceived rewards of mastery which enhances motivation and ultimately performance (LePine, LePine, & Jackson, 2004; LePine, Podsakoff, & LePine, 2005). Research suggests that challenge stressors contribute to constructive attitudes and behaviors like satisfaction, commitment, and efficacy (Beehr et al., 2001; Boswell, Olson-Buchanan, & LePine, 2004; Podsakoff, LePine, & LePine, 2007; Webster, Beehr, & Love, 2011). Hindrance stressors include role ambiguity, role conflict, and organizational politics which are typically experienced as situational constraints that are difficult to address with reasonable effort, resulting in constrained motivation and performance (Boswell et al., 2004; LePine et al., 2004; LePine et al., 2005; Podsakoff et al., 2007; Webster et al., 2011). Role ambiguity and conflict contribute to adverse role stress, whereas workload may be a constructive stressor until stress levels exceed the coping skills and resources available to the employee (Crawford, LePine, & Rich, 2010; Jamal, 1984, 1985; Newton & Teo, 2014; Schaufeli & Bakker, 2004; Singh, Goolsby, & Rhoads, 1994)

The general view that high levels of role stress are detrimental to individuals and organizations has been widely supported and the subject of over 300 journal articles (Ortqvist & Wincent, 2006). Organizational and individual problems associated with role stress include absenteeism (Goetzel et al., 1998), turnover (Mann, 1996), burnout (Holloway & Wallinga, 1990), emotional exhaustion (Posig & Kickul, 2003), deteriorating personal health (Cooper, Dewe, & O'Driscoll, 2001), job dissatisfaction (Cervoni & DeLucia-Waack, 2011), reduced organizational commitment (Johnston et al., 1990), and lower performance (Abramis, 1994; Babin & Boles, 1996a, 1996b; Lindegård et al., 2014; Oldenburg et al., 2014; Rebele & Micheals, 1990).

The potential costs of role stress to both individuals and organizations highlight the importance of understanding individual and organizational causes (Lawson, Savery, & Luks, 2001). Research has shown that the personal attributes of employees influence both their perception of their role and their ability to manage role stress which ultimately influences performance (Connor-Smith & Flachsbart, 2007; Flynn, Chatman, & Spataro, 2001; Harzer & Ruch, 2015).

Hypotheses

The general proposition guiding this research study is that attention-related disorders and role stress are positively associated. More specifically, this research proposes that each of the symptom clusters associated with attention-related disorders (difficulties with activating/organizing to work, inattention/concentration, energy/effort, emotional interference, short term working memory, hyperactivity) are positively related to role stress. This research also proposes that roles stress will have a significantly stronger association with AAD as opposed to DSM-based hyperactivity-

impulsivity. Finally, this research proposes that the emotional liability symptom cluster will have a significant independent impact on role stress as discovered in a previous research study (Coetzer & Richmond, 2007). This previous finding suggests the need for a separate emotion based theory of the disorder and a potential link with emotional intelligence, an emerging variable within the individual and team performance nomological network.

Adults need to attend to multiple sources of continually evolving role information and they need to reflect on, organize, perceptually close and integrate this information into a coherent understanding of their role requirements. They need to repeat this process on a regular basis to ensure that the role remains aligned with an often fluid performance situation. They need to stay organized, keep up with the pace of work on all key tasks, not just tasks of interest, make quality contributions in a timely manner and adjust as new conditions arise.

Adults need to develop and maintain constructive relationships that support the accurate exchange of role information, the successful negotiation of role requirements and assistance in executing role requirements. Adults also need optimal use of higher order cognitive processes in order to both develop the arguments that support effectively managing the design of a role, and express their perspectives in a non-reactive and socially skilled manner.

Adults who experience difficulties with organizing/activating to work, sustaining concentration, sustaining energy/effort, managing emotional interference and using short term memory are less likely to manage their role effectively resulting in higher levels of role stress. Disordered adults are also more likely to experience more intense negative emotions and perceptions of situations that are perceived as threatening (Gomez et al., 2012) adding to the experience of role stress.

Hypothesis 1: Adult attention deficit is positively associated with role stress.

Difficulties with organizing and activating to work, sustaining attention and effort on all key role requirements, and making efficient use of short term working memory will constrain personal productivity and promote an experience of too much work relative to personal resources. A persistent constraint on personal productivity should create a backlog of tasks further contributing to the experience of role overload.

Hypothesis 1a: Adult attention deficit is positively associated with role overload.

Difficulties with sustaining attention and effort, managing emotional interference, and using working memory should constrain the development of a clear, detailed and well-integrated perception of a role. These challenges should also make it more difficult to understand role requirements as conditions change. The social challenges caused by impulsivity and emotional reactivity will make it more difficult to engage others in the process of clarifying a role. This situation should contribute to an ongoing sense of confusion about the requirements of a role.

Hypothesis 1b: Adult attention deficit is positively associated with role ambiguity.

Difficulties with gathering, integrating and updating role information into a detailed and coherent understanding of a role should constrain the ability to shape a role. Difficulties comprehending a role and managing the complex intellectual, social, and emotional dynamics required to manage role conflicts by negotiating needed adjustments should lead to higher levels of role conflict. The higher likelihood of disordered adults significantly favoring tasks of personal interest that are immediately gratifying and avoiding tasks that are cued to punishment increases the likelihood of role conflict.

Hypothesis 1c: Adult attention deficit will be positively associated with role conflict.

Hyperactive and impulsive adults will have difficulty developing and maintaining the constructive relationships that support the efficient and effective communication of role information. They will also have more difficulty managing workload, removing role conflicts and creating greater role alignment with personal preferences when dealing with non-supportive managers and colleagues. Hyperactive-impulsive adults will also have difficulty completing sedentary but necessary tasks in a proper manner, which should contribute to the experience of role overload.

Hypothesis 2: Hyperactivity-impulsivity (DSM criteria) will be positively associated with role stress.

The impact of inattention and related cognitive, emotional, and effort-oriented symptoms on role stress will be greater than the social disruption and difficulties with sedentary tasks produced by impulsivity-hyperactivity. Attention deficits and related symptoms also contribute to social disruption when inattentive employees are misperceived as intentionally disinterested, superior and rude. Difficulties with work, effort, and working memory may be perceived as laziness, social loafing, a lack of commitment and a lack of intelligence, and may evoke additional resentment if the disordered person is relatively more reliant on coworkers. Both the lack of social grace and difficulties with sedentary tasks caused by hyperactivity-impulsivity are more likely to be accommodated by managers and coworkers than inattentive employees who are perceived as lazy, disinterested, rude, a burden, and not very intelligent. Hyperactive-impulsive adults may overcome social deficits by being more forceful in managing the elements of a role whereas inattentive types may not be able to develop or sustain the required arguments and effort. The likelihood of a relatively greater reduction in hyperactivity-impulsivity symptoms also suggests that adult attention deficit will have a significantly greater association with role stress. The relatively greater presence, impact and difficulty managing attention deficits and related cognitive symptoms with regard to a role will result in a relatively stronger association with role stress.

Hypothesis 3: Adult attention deficit will have a significantly stronger relationship with role stress than hyperactivity-impulsivity (DSM criteria).

The rising cognitive and emotional load of personal, academic and occupational roles suggests that the emotional liability component of the disorder will contribute significantly to the experience of role stress. Emotional liability has both a bottom-up and top-down component. The top-down component relates to emotional recognition and regulation which is supported by the higher order executive functions, whereas the prevalence of disruptive moods and the intensity and frequency of disruptive episodic feelings, is more of a bottom up process. Although the top-down component is likely to be associated with other symptoms clusters that are linked to executive functioning, the emotional liability symptom cluster should be relatively independent due to the significant presence of bottom-up components. Previous research conducted by Coetzer and Richmond (2009) suggests that the emotional liability component of AAD makes a significant and independent contribution to role stress.

Hypothesis 4: Difficulty with emotional interference will have a significant, positive relationship with role stress after controlling for all the other dimensions of adult attention deficit.

Methods

Subjects and Procedures

The subjects were 158 business graduate students attending universities in the United States. All of the subjects were engaged in paid employment and were actively managing a variety of personal, academic, and occupation roles. Data collection took place while students were participating in a course that required them to work on an autonomous project team that was responsible for completing a significant business project. In addition to managing roles outside of the course, participation in the autonomous project team required the subjects to gather, analyze, integrate and update role information. They also needed to negotiate with others in order to shape their role requirements and avoid and/or manage role conflicts. Each subject was asked to identify someone who knew them well and would be willing to complete an honest assessment of their behavior. The observers completed observer versions of both the Brown Attention Deficit Disorder Scale (BADDS) and the DSM hyperactivity-impulsivity components of the Screening Version of the Conners Adult ADHD Scale (CAARS). The subject observers completed the measures under conditions of anonymity. Each of the subjects completed a self-report measure of role stress.

Principle components factor analysis with a Varimax rotation were used to confirm the dimensionality of the role stress measure and examine the contribution of the individual items to the factors. Product moment correlations were used to test all the hypotheses regarding associations between the measures. The Williams T2 statistic (Williams & Lambert, 1959) as recommended by Steiger (1980), was used to determine whether role stress had a significantly stronger association with AAD than DSM based hyperactivity-impulsivity. Simultaneous linear regression was used to test the hypothesis that difficulty with emotional interference has a significant positive relationship with role stress after controlling for all the other dimensions of adult attention deficit and DSM hyperactivity-impulsivity.

Measures

Adult Attention Deficit (ADD)

The Brown (1996, 2001) Attention Deficit Disorder Scale (BADDS) was used in this research study to measure adult attention deficit (AAD). The instrument was designed and validated for use with adults 18 years and older, and focused on the measurement of attention deficit and related cognitive symptoms. The 40 self-report items on the BADDS are grouped into 5 clusters of conceptually related symptoms of AAD. The observer version rephrased the questions from first person singular to third person singular to support observer ratings (e.g., "I am disorganized" was changed to "the person being described is disorganized"). Organizing and activating to work (*cluster 1*) measured difficulty in getting organized and started on tasks (e.g., "experiences excessive difficulty getting started on tasks" and "needs to be reminded by others to get started or to keep working on tasks that need to be done"). Sustaining concentration (*cluster 2*) measured problems in sustaining attention while performing tasks (e.g., "listens and tries to pay attention but soon becomes distracted" and "misses important information"). Sustaining energy and effort (*cluster 3*) measured problems in maintaining the required energy and effort while performing tasks (e.g., "runs out of steam and doesn't follow through" and "cannot complete tasks within the allotted time"). Managing affective interference (*cluster 4*) measured difficulty with moods, emotional reactivity, and sensitivity to criticism (e.g., "is easily irritated" and "has a short fuse with sudden outbursts of anger"). Utilizing working memory and accessing recall (*cluster 5*) measured forgetfulness in daily routines and problems in recall of learned material (e.g., "intends to do things but forgets" and "forgets to bring needed things"). Each question used a 4-point scale (*0=never, 1=once a week, 2=twice a week, 3=almost daily*) to rate the frequency with which the behavior was demonstrated by the observed person. The total score for a symptom cluster was generated by adding the scores on the questions associated with that symptom cluster. A total score for AAD was generated by adding up the scores on all of the questions. The observers completed the assessment under conditions of anonymity.

Conners Adult ADHD Rating Scale (CAARS)

The Connors Adult ADHD Rating Scale (CAARS) was used to measure DSM-based hyperactivity-impulsivity. The instrument was also designed and validated for use with adults 18 years and older (Conners et al., 1999) and is among the most widely used instruments for measuring AADHD (Sáez-Francàs et al., 2012). There are both long and short versions of the CAARS which are available in self-report, observer, and screening forms. The observer-screening form contains 30 questions of which 9 correspond directly with the DSM list of symptoms for hyperactivity-impulsivity. These questions were used to measure DSM hyperactivity-impulsivity (e.g., "talks too much"), and were scored on a Likert-type scale (*0 = not at all or never; 1 = just a little, once in a while; 2 = pretty much, often; and 3 = very much, very frequently*). A total hyperactivity-impulsivity score was generated by adding up the scores on each of the questions. The observers completed the assessment under conditions of anonymity.

Role Stress

Items for measuring role ambiguity, role conflict and role overload were generated after reviewing the Role Stress Inventory (Rizzo, House, & Lirtzman, 1970), Occupational Environment Scale (Osipow & Spokane, 1983), Role Clarity Index (Kahn et al., 1964), and the Work Stress Inventory (Barone et al., 1984). The items needed to be worded in a more general manner so as to capture role ambiguity, role conflict, and role overload as it pertained to the more general context faced by working students. Four items were chosen for each of the dimensions of role stress. An example item for role ambiguity was: "I don't have a clear sense of the important tasks that I need to complete." An example item for role conflict was: "The important tasks I need to do often conflict with one another." An example item for role overload was: "I have more tasks that I can effectively manage." Subjects used a 7-point Likert scale (*1=strongly disagree, 2=disagree, 3=slightly disagree, 4=neutral, 5=slightly agree, 6=agree, 7=strongly agree*) to rate the extent to which they agreed with each item. Scores for each dimension of role stress were derived by adding up the scores for the associated items. A total score for role stress was derived by adding up the scores for each of the dimensions.

Results

Descriptives, Factor Analysis and Correlations

A principle components factor analysis with an orthogonal rotation (Varimax) was conducted to examine the structure of the role stress measure (see Table 1).

Table 1: *Principle Components Factor Analysis of Role Stress Items with a Varimax Rotation*

	Component		
	1	2	3
With regard to your personal, academic and occupational roles:			
I have more tasks than I can effectively manage	0.84		
I'm not able to complete all the tasks I need to get done	0.81		
I'm worried that I have more tasks than I can cope with	0.78		
I constantly feel overwhelmed by the tasks that I need to do	0.77		
I don't have a clear understanding of the important tasks in my life		0.90	
I'm not clear about all the tasks that I need to do		0.86	
I'm confused about many of the tasks I need to do		0.88	
I don't have a clear sense of how all the tasks I need to do fit together		0.72	
Many of the important tasks that must be done prevent me from doing other important tasks			0.86
Successful completion of many of my important tasks means poor performance on others			0.86
I often have difficulty deciding which tasks to do because they conflict with doing other tasks			0.78
The important tasks that I need to do often conflict with one another			0.67

The factor analysis produced 3 factors with the items for role overload, role conflict, and role ambiguity each forming a separate factor. Factor loadings for role overload (0.84 to 0.77), role ambiguity (0.90 to 0.72), and role conflict (0.86 to 0.67) suggested that each item was making a meaningful contribution to the measure. The Cronbach

alpha of internal reliability coefficients for each of the factors ranged from 0.86 to 0.89, and none of the internal reliability coefficients could be improved by eliminating items. This suggested that each dimension of the measure had good internal reliability and each item was making a meaningful contribution to the measure. Means, standard deviations, and correlations appear in Table 2.

Table 2: *Means, Standard Deviations, Internal Reliabilities and Correlations*

		Mean	Std Dev	1	2	3	4	5	6	7	8	9	10	11
1	Role Overload	17.2	4.91	0.87										
2	Role Ambiguity	12.7	4.44	.39**	0.89									
3	Role Conflict	15.07	4.45	.53**	.46**	0.86								
4	Total Role Stress	44.96	11.1	.81**	.76**	.82**	0.90							
5	Difficulty Organizing and Activating to Work	10.59	4.55	.20**	.32**	.30**	.34**	0.84						
6	Difficulty Sustaining Attention and Concentration	12.42	4.46	.19*	.23**	.33**	.31**	.58**	0.79					
7	Difficulty Sustaining Energy and Effort	8.73	4.58	.28**	.32**	.37**	.40**	.71**	.58**	0.85				
8	Difficulty with Emotional Interference	6.98	3.52	.35**	.26**	.31**	.38**	.62**	.48**	.56**	0.83			
9	Difficulty with Short Term Working Memory	7.04	3.36	.23**	.34**	.30**	.36**	.55**	.43**	.62**	.47**	0.78		
10	Adult Attention Deficit	43.78	16.58	.31**	.36**	.40**	.44**	.87**	.77**	.87**	.76**	.74**	0.88	
11	DSM-Hyper/Impulsivity	6.52	4.71	.05	.06	.11	.09	.28**	.24**	.15*	.23**	.27**	.29**	0.82

Note 1: Cronbach Alpha internal reliabilities are shown on the diagonal

Note 2: ** = correlations statistically significantly at the level $p < 0.01$ (2 tailed) *= $p < 0.05$ (2 tailed)

All variable distributions were approximately normal and demonstrated reasonable variation across their respective scales. No univariate or bivariate outliers were considered problematic and the product moment correlations revealed significant associations between the variables. Cronbach alpha internal reliability coefficients ranged from ($\alpha = 0.78$) to ($\alpha = 0.90$) which suggested good internal reliabilities. The linear regression produced no problematic residuals.

Empirical Tests of Hypotheses

The significance threshold for all the empirical tests was set at $\alpha = 0.05$ (2 tailed). The correlation between AAD and role stress (*Hypothesis 1*) was statistically significant ($r = 0.44$, $p < 0.01$) and provided support for the hypothesis that AAD is associated with role stress. The correlation between AAD and role overload (*Hypothesis 1a*) was statistically significant ($r = 0.31$, $p < 0.01$) which provided support for the hypothesis that AAD is associated with role overload. The correlation between AAD and role ambiguity (*Hypothesis 1b*) was statistically significant ($r = 0.36$, $p < 0.01$) which provided support for the hypothesis that AAD is associated with role ambiguity. The correlation between AAD and role conflict (*Hypothesis 1c*) was statistically significant ($r = 0.40$, $p < 0.01$) which provided support for the hypothesis that AAD was associated with role conflict. The correlation between DSM hyperactivity-impulsivity and total role stress (*Hypothesis 2*) was not statistically significant ($r = 0.09$, $p = 0.24$) which did not provide support for the hypothesis that DSM hyperactivity-impulsivity is associated with role stress. The Williams T2 test was significant (t=-4.08, $p < 0.00$) which provided support for the hypothesis that AAD has a significantly stronger association with role stress than DSM hyperactivity-impulsivity (*Hypothesis 3*). The simultaneous

liner regression of all the adult symptom clusters on role stress resulted in a significant beta coefficient (β=0.20, sig=0.035) for difficulty with emotional interference. This provided support for the hypothesis that difficulty with emotional interference has a significant positive relationship with role stress after controlling for the other symptom clusters (*Hypothesis 4*).

Table 3: *Results of Regressing the Sympton Clusters of AAD on Role Stress*

R	R Square	Adjusted R Square	Std. Error Estimate		
.47	0.22	0.19	9.94		
	Sum of Squares	df	Mean Square	F	Sig.
Regression	4282.93	6.00	713.82	7.21	0.00
Residual	15042.62	152.00	98.96		
Total	19325.56	158.00			
	Beta	Sig			
DOAW	-0.03	0.77			
DSAC	0.10	0.31			
DSEE	0.16	0.18			
DWEI	0.20	0.03			
DWWM	0.16	0.90			
DSM-HI	-0.40	0.60			

***Note**: DOAW = difficulty organizing and activating to work, DSAC = difficulty sustaining attention and concentration, DSEE = difficulty sustaining energy and effort, DWEI = difficulty with emotional interference, DWWM = difficulty with working memory, DSM-HI=DSM based hyperactivity-impulsivity*

Discussion

General

The results of this research confirmed an association between adult attention deficit and role overload, role ambiguity, and role conflict. The direction of the association between AAD and role stress cannot be determined from this study but there is probably a bidirectional relationship that may result in a reinforcing and debilitating cycle. DSM-based hyperactivity-impulsivity was not significantly associated with role stress and AAD had a significantly stronger association with role stress. This supported the view that the DSM-based hyperactivity-impulsivity component of the disorder was relatively less prevalent in adults and less impactful on adult functioning. The exclusion of this symptom cluster required careful consideration because DSM hyperactivity-impulsivity was significantly correlated (weak to somewhat moderate strength) with all the other symptom clusters which suggested a separate but related dimension with limited impact on role stress.

Results from the simultaneous regression suggested that the emotional liability component of the disorder may have made a significant and unique contribution to difficulties within the nomological network that determined individual performance in the workplace. The disorder may be associated with emotional intelligence (EI) which is an emerging variable within the individual and team performance nomological network (Salovey & Mayer, 1990; Goleman, 1996; Kelley & Caplan, 1993; Bell, 2007;

Koman & Wolff, 2008; Landale, 2007). Many practitioners and researchers consider EI to be an apex variable that influences many other variables within the performance network (Goleman, 1996; Koman & Wolff, 2008; Landale, 2007). An association between AAD and EI may help to explain how the disorder influences performance. This supports the need for an emotion-based theory of the disorder which will guide an examination of the relationships between AAD, emotional intelligence, and performance in organizations.

Implications for Organizations and Education Institutions

Organizations wishing to limit disruptive levels of role stress experienced by their employees need to be aware of the influence of AAD. The emergence of more fluid roles, employee empowerment, self-regulation, teams, and project-oriented work may be especially challenging for disordered employees, even though they may have a preference for working without supervision. Disordered employees without the necessary support will not be able to leverage their strengths and may constrain the performance of interdependent others.

The increasing availability of effective coaches (life, organizational, task, peer, manager as coach, etc.) (Theeboom, Beersma, & van Vianen, 2014) offers a potential substitute for close supervision and a potentially more accepted and developmental resource for helping disordered employees manage their role. Effective organizational coaches could address a wide range of cognitive, emotional and behavioral deficits, and protect the employee from the reinforcing cycles of failure that many disordered employees experience (Nadeau, 1997). Effective organizational coaches may also help disordered employees manage their relationships with managers and coworkers which will should help to reduce role stress. Establishing a reciprocal peer coaching system that addresses challenges at the individual and relational level may add considerable mutual value, especially for disordered employees who need to address interdependent role issues with their coworkers. Coaching processes that contain the necessary structure and content for supporting disordered employees are needed.

The effective use of teams represents a considerable opportunity for distributing the creative benefits associated with the disorder while managing the deficits. Team members can help disordered employees to activate, organize, stay on track, maintain a balance between OCB and priority work tasks, avoid experiences of failure and manage challenging emotions. Supportive team-members can also assist disordered team members to better manage their role and reduce role stress. In return, team members can benefit from the creativity that disordered employees may offer. This will require the careful design of teams to ensure optimal person-role fit and supportive team development interventions. Team building that educates team members about the disorder and addresses the social and task performance challenges while taking advantage of the benefits is required. Team building activities should include a significant emphasis on role (re)negotiation which should help to reduce role stress. Introducing regular role design and role management conversations should help all employees to regularly clarify role requirements, establish and effectively manage workload, align role requirements with strengths, and reduce both intra and inter role conflicts. Structured collaborative decision making processes that provide team

members with the opportunity to locate themselves were they fit best should improve person-role fit. Pairing disordered employees with less creative but more organized, emotionally intelligent, assertive, and cooperative employees may offer mutual benefit and provide needed support for managing a role more effectively. The independent and significant contribution of emotional liability reinforces the potential value of training, coaching and team interventions that build emotional intelligence.

The multi-modal approach to managing the disorder in the workplace suggests that sustained improvement will depend on other forms of support like the general education of both managers and employees, establishing supportive organizational cultures and climates, appropriate medication, and coaching/training that address key underlying cognitive, emotional, and behavior deficits (e.g., retention training to support short term working memory). The provision of employee assistance programs that provide disordered, potentially disordered, and non-disordered employees with information and opportunities for assessment is an important part of the constructive management of employee diversity. This will help to create a more inclusive, supportive, and responsive organizational culture. This will also increase the likelihood of the employee seeking out other important parts of multimodal treatment, particularly medicinal support.

Education institutions, like management programs within universities, need to assist new managers to recognize and respond to the symptoms of the disorder in both themselves and others. Early diagnoses and treatment may help to prevent the exacerbating cycles of failure that often accompany the condition. Educating future managers about the condition will help to ensure that they do not become a contributor to the emergence and reinforcement of such cycles through ignorance or the inability to be supportive. Communication skills training/coaching, peer coaching systems, and student team interventions that emphasize cooperative role management will help prepare all future managers for the challenges of the contemporary workplace.
Increasing social, economic and legal pressures to provide reasonable accommodation for functional but disordered employees and take appropriate advantage of employee diversity underscores the general social value of this research.

Limitations and Suggestions for Future AAD Research

This research study is limited by measures of AAD that may not fully represent all the key symptom clusters and the use of both an indirect workplace sample and a more general measure of role stress. Future research requires use of samples and a role stress measure that is more directly associated with the workplace. The content validity and dimensionality of the adult form of the disorder, including the identification and confirmation of subtypes, requires further research. Effective organizational behavior research of the disorder requires a validated instrument with self-report and observer versions that encompasses all the key adult symptom clusters and represents all the key underlying systems that comprise the total etiology. Such an instrument should also include any constructive manifestations of the disorder like creativity and an entre/intrapreneurial orientation. Such an instrument will provide greater ability to explore both the negative and positive influence of the disorder within the individual and team performance nomological network and help to explain suspected associations

with important positive states like entre/intrapreneurial cognition and behavior. The inclusion of items related to exploratory excitability and novelty seeking with the Conners measure of adult ADHD supports the need for further consideration of the items entered into the instrument validation process. The inclusion of additional items will require justification provided by ongoing research that examines the relationships between existing measures and suspected correlates, including work related variables. The development of coherent and comprehensive theories that explain the various systems that comprise the total etiology are also needed to identify potential symptoms, including an emotion oriented theory of the disorder.

Future research that examines the influence of the disorder on apex causal and outcome variables within the individual and team performance nomological network is urgently needed. Research on variables like work-related efficacy, emotional intelligence, self-leadership, task/project management, time management, creative problem solving, diversity management, and conflict management will help to identify the influence of the disorder on key variables throughout the performance network. Research on key performance outcomes like productivity, quality and cohesion in key task/performance contexts like idea generation in product development teams will help identify task and context specific impacts. This research supports the general proposition that the disorder has significant influence within the nomological network that determines individual, team, and organizational performance.

Providing a Roadmap for Research on ASD in the Workplace

Lessons learned from the review of AAD research helps to ensure more efficient and effective research on adult ASD in the workplace. Even though the disorder remains prevalent through adolescence and childhood, the adult form of the disorder may possess a somewhat different symptom structure and relative intensity of symptom clusters. Identifying and addressing symptom clusters typically ignored because they have a more neutral or positive impact may also undermine the content validity of the adult construct. Taking time to confirm the content and structure of adult ASD, including symptom clusters with potentially positive associations, is necessary to ensure appropriate measurement and research going forward.

Addressing the issue of how to determine the level of the disorder through the use of a symptom count or dimensional measurement, and whether to emphasize categorical (disordered vs. healthy) or correlational analysis is important for providing clear and comprehensive research outcomes. Although symptom clusters are typically related and therefore present a potential multicollinearity problem, the use of simultaneous linear regression with all the symptom clusters as independent variables is important for determining relatively independent nomonoligical networks between particular symptom clusters and particular organizational behaviors. This is important for ensuring that intervention strategies include all the actions required to address all the key and relatively independent aspects of the symptom structure. The use of simultaneous linear regression that includes all the symptom clusters should be a part of the process of researching the relationship between adult ASD and organizational behavior variables of interest, unless the multicollinearity (variance inflation factors and tolerance) becomes extreme, which has seldom been the case when researching

the relationship between AAD symptom clusters and organizational behavior variables.

The multimodal approach to treating neurobehavioral disorders must be kept in mind when developing strategies for eliminating, remediating, accommodating and seeking appropriate organizational advantage from a NBD. The multimodal approach suggests that successfully addressing a disorder requires: (1) medicinal interventions, (2) cognitive, emotional, and behavioral interventions (CEBI), and (3) environmental adjustment or alignment. Researchers and practitioners must also keep in mind that CEBIs take place at various levels, ranging from deeper (distal) therapeutic interventions that target the roots of symptom clusters to more proximate interventions that address more immediate (proximal) manifestations.

The growing recognition that NBDs are prevalent within the global workforce and have a significant economic impact supports the need for conducting rigorous research on the relationship between NBDs and organizational behavior. A review of research on AAD (most commonly diagnosed NBD) in the workplace would help to provide guidelines for researching other NBDs in the workplace, like ASD.

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