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Contents

Editor's Corner

Peter Arnett, Ph.D.,
NAN Bulletin Editor

As the Editor of the *NAN Bulletin*, I am very pleased with our latest issue, with a focus on Attention Deficit Hyperactivity Disorder (ADHD), a commonly seen presentation in neuropsychology practices. ADHD has been intensively studied by neuropsychologists, with more research in recent years focusing on adult ADHD. In the Professional Issues section of this *NAN Bulletin*, four experts in the field address core issues of interest in ADHD that are relevant to practitioners. These include: 1) The implications of comorbid anxiety for clinical practice; 2) exercise as a treatment for ADHD; 3) detecting feigned adult ADHD; and 4) using diffusion modeling methods for deriving additional information on reaction time tasks beyond mean accuracy and reaction time that may better illuminate the nature of cognitive deficits in ADHD. As with other recent issues, to enhance translation of the research reviewed to clinical practice, each article in this section includes several clinical take home points.

The Student Corner section of the *Bulletin* includes a discussion by a current doctoral student about how his ADHD research has informed his clinical practice, with a particular focus on considering context in assessing executive functions in ADHD. In the Journal Section, a recent article published in *Psychological Medicine* is reviewed that focuses on a randomized clinical trial of cognitive-behavioural therapy in adults with ADHD who also have co-morbid psychopathology. Finally, we have included a Special Topics section in this issue that includes two short pieces of great practical significance. The first discusses approaches for making neuropsychology more relevant to the general public, and the second reviews an advocacy model for neuropsychology that is designed to coordinate and streamline national practice advocacy efforts. This latter piece includes a nice example of how this model worked successfully in one particular case.

Of note, Dr. John Randolph has continued to serve as Associate Editor of the *Bulletin*, and was instrumental in working with me on completing this issue. We also appreciate the continued help from the members of the NAN Publications Committee, formerly chaired by Dr. Phil Fastenau, who provided valuable input on the contributions to this issue.

Peter Arnett, Ph.D.,
Professor & Director of Clinical Training at Penn State University
NAN Bulletin Editor

Opinions expressed by the authors and advertisers do not necessarily reflect the position of the National Academy of Neuropsychology.

Patient Corner

Useful Books on ADHD:

- *Delivered From Distraction* by Edward Hallowell, M.D. & John Ratey, M.D.
- *Executive Skills in Children and Adolescents* by Peg Dawson, Ed.D. & Richard Guare, Ph.D.
- *Taking Charge of Adult ADHD* by Russell Barkley, Ph.D. & Christine Benton
- *Learning Outside the Lines* by Jonathan Mooney & David Cole

Useful Websites on ADHD:

- National Institute of Mental Health ADHD page:
- http://www.nimh.nih.gov/health/publications/attention-deficit-hyperactivity-disorder-easy-to-read/index.shtml
- The National Resource on ADHD: www.chadd.org
- The Educators' Guide to Learning Disabilities & ADHD: www.ldonline.com

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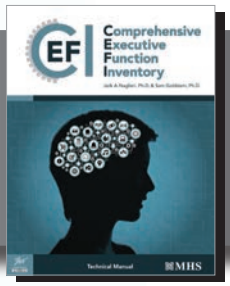

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Student Corner

How my ADHD Research as a Graduate Student Influences my Clinical Practice: The Importance of Considering Context When Assessing Executive Function Deficits

Alex Weigard, M.S.
Penn State University

As a graduate student at Penn State, the primary focus of my research has been to better characterize the causes and consequences of deficits in executive functions in ADHD and co-occurring disorders, such as substance abuse. Specifically, my work with Dr. Cynthia Huang-Pollock has used mathematical models of cognitive processes and neuroimaging to test hypotheses about which underlying neural mechanisms lead to the behavioral differences observed on executive function tests in ADHD. On these tests, individuals with ADHD exhibit longer response times, higher error rates and increased performance variability. This work, combined with my clinical experience in neuropsychological assessment, has fueled my interest in developing better tools for understanding how differences in neurocognitive functions may lead to the academic, social and behavioral challenges faced by individual clients with ADHD. Given that deficits in working memory, inhibition and other executive functions routinely assessed in neuropsychological testing are the most consistently-identified cognitive differences between individuals with ADHD and their peers, I believe that neuropsychological assessment has a large role to play for understanding and treating these problems.

However, one of the most consistent findings of executive function deficits in ADHD, as measured by cognitive tests, is their inconsistency. Despite large effect sizes for performance differences between individuals with ADHD and controls in tests of working memory, response inhibition, vigilance and planning, normative deficits in executive functions are only present in 35-50% of individuals with the disorder (Nigg et al., 2005). Thus, in clinical practice, the majority of individuals who meet criteria for a diagnosis of ADHD may be expected to show no deficits in executive functions during cognitive testing. Furthermore, there is much less evidence for the utility of neuropsychological testing in management of ADHD than there is for many other medical conditions (Pritchard et al., 2012) and tests of executive functions have often been found to be poor predictors of functional impairment in the disorder (Barkley & Murphy, 2010; Jonsdottir et al., 2006). Why might this discrepancy between performance deficits and behavioral manifestations of the disorder exist?

The answer is likely related to the fact that an individual's executive functioning may vary widely depending on the environmental context and their emotional or motivational state. One of the most compelling phenomena in clinical work is how the ability of children with ADHD to control their behavior frequently improves, if only temporarily, when an environment has a clear and consistent structure. Furthermore, a growing body of evidence, some of it gained from studies conducted in our lab, suggests that executive functioning in ADHD is strongly affected by arousal (Weigard, Huang-Pollock & Brown, in press), interference from negative emotions (Shaw et al., 2014), and an individual's motivation to engage in a task (Rosch & Hawk, 2013). With regard to these factors, the highly structured context of a typical neuropsychological testing session (in both clinical and research settings) can often be very different from the classroom, family and social environments where an individual with ADHD experiences difficulty. The fact that the testing environment is typically novel, or that examinees are aware of the importance of their test results, may also drastically improve their arousal or motivation during testing relative to the contexts in which they typically struggle in their daily lives.

In my own clinical work, I try to address the disparity between performance in testing sessions and real-world executive dysfunction by looking at neuropsychological data side by side with reports and rating scales that indicate the specific contexts and states an individual tends to struggle the most in. By comparing this information with behavioral observations during the testing session, I try and gauge the ways in which their performance during testing may or may not be reflective of their executive functioning ability outside of the clinic or lab. As it is usually impossible to replicate the contexts that an individual struggles in during day-to-day life in an assessment or research setting, there are no easy ways to resolve this issue. However, until more sensitive objective tests or more advanced statistical methods for diagnosis are developed, assessment of executive functions in this complex and heterogeneous disorder will require careful consideration of rating scales, reports from parents, teachers and friends, a client's developmental history, and other indicators of the specific contexts that an individual struggles in.

Alexander Weigard is currently a 4th year doctoral student in The Pennsylvania State University's clinical psychology program and specialization in neuroscience. He is interested in using mathematical models from cognitive science and neuroimaging methods to better define and understand the basic mechanisms that underlie self-regulation problems in ADHD and other disorders. He hopes to eventually use quantitative modeling of neuropsychological functions to develop more advanced tools for the clinical assessment of these functions.

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Pritchard, A. E., Nigro, C. A., Jacobson, L. A., & Mahone, E. M. (2012). The role of neuropsychological assessment in the functional outcomes of children with ADHD. *Neuropsychology review, 22*(1), 54-68.

Rosch, K. S., & Hawk, L. W. (2013). The effects of performance-based rewards on neurophysiological correlates of stimulus, error, and feedback processing in children with ADHD. *Psychophysiology, 50*(11), 1157-1173.

Shaw, P., Stringaris, A., Nigg, J., & Leibenluft, E. (2014). Emotion dysregulation in attention deficit hyperactivity disorder. *American Journal of Psychiatry*.

Weigard, A., Huang-Pollock, C., & Brown, S. (in press). Evaluating the consequences of impaired monitoring of learned behavior in ADHD using a Bayesian hierarchical model of choice response time. *Neuropsychology*.

HONE-In

Health Outcomes and Neuropsychology Efficacy Initiative

Brought to you by:

National Academy of Neuropsychology

Legislative Action & Advocacy Committee

Neuropsychologists are increasingly being asked to provide evidence of effectiveness to support reimbursement for neuropsychological services, yet this information is not always easily accessible to neuropsychology practitioners. In response to this challenge, the National Academy of Neuropsychology (NAN) authorized its Legislative Action and Advocacy Committee (LAAC) to launch an initiative that would help NAN membership respond to these practice challenges. The result was the Health Outcomes and Neuropsychology Efficacy Initiative (HONE-In).

The primary goal of HONE-In is to assist NAN membership in any effort to demonstrate the value of neuropsychological services through cost effectiveness and/or cost savings.

HONE-In Phase I Sample Article Summary

BRAIN INJURY, CONCUSSION, REHABILITATION

The predictive validity of a brief inpatient neuropsychologic battery for persons with traumatic brain injury.

Population: Traumatic brain injury, Inpatient rehabilitation
Categories: Outcome prediction
Authors: Hanks RA, Millis SR, Ricker JH, Giacino JT, Nakase-Richardson R, Frol AB, Novack TA, Kalmar K, Sherer M, Gordon WA.
Date: 2008
Title: The predictive validity of a brief inpatient neuropsychologic battery for persons with traumatic brain injury
Type: Journal article
Citation: Hanks, R. A., Millis, S. R., Ricker, J. H., Giacino, J. T., Nakese-Richardson, R., Frol, A. B., et al. (2008). The predictive validity of a brief inpatient neuropsychologic battery for persons with traumatic brain injury. Archives Of Physical Medicine And Rehabilitation, 89(5), 950-957.

Utility: Prospective study of predictive validity of NP assessment during subacute brain injury rehab, including pts in PTA, within ~ 1 month of injury. Brief NP assessment predicted handicap, functional outcome, supervision needs, employability in adults w/ TBI at 1 year. Adding NP increased predictive power over injury severity and early functional status (with exceptions – SWLS and FIM Motor). Including those w/ PTA did not diminish predictive validity. Findings important given trend toward shorter rehab stays, strengthens argument for role of NP testing during acute rehab.

Synopsis and review of: Young, S.,Khondoker, M., Emilsson, B., Sigurdsson, J.F., Philipp-Wiegmann, F., Baldursson, G., Olafsdottir, H., & Gudjonsson, G. (2015). Cognitive–behavioural therapy in medication-treated adults with attention-deficit/hyperactivity disorder and co-morbid psychopathology: a randomized controlled trial using multi-level analysis. Psychological Medicine, 45, 2793–2804.

Review by Peter Arnett, Ph.D., Penn State University

Rationale for the Study:

Adult ADHD is common, affecting approximately 2.5 to 5% of the population. The first line of treatment is usually medication, but medication is typically effective in only about 50% of individuals treated. CBT and group therapy have been shown to decrease primary symptoms of ADHD, producing effect sizes comparable to medication. Currently, the evidence base seems to show that the combination of medication and therapy produces the greatest treatment effects. As such, international guidelines recommend a multimodal treatment approach, that is, one that combines pharmacological and psychological interventions. In actual practice, however, there is far greater reliance on medication as a first line of treatment. There appears to be only one published study that has compared CBT alone versus CBT with medication (dextroamphetamine) in adults, and the effects were comparable on primary ADHD outcomes for CBT alone compared with CBT and medication.

Comorbid psychopathology in ADHD is high, with approximately an 80% increase among individuals with ADHD compared with the general population. Depression and anxiety are especially common. There are three published RCT's on group psychotherapy on secondary outcomes like depression and anxiety in adult ADHD. Two of the studies reported no impact on these secondary outcomes for group therapy, but one study (Emilsson et al., 2011) found large effect sizes for ADHD symptoms as well as secondary outcomes including anxiety and depression at a 3-month follow-up. Perhaps surprisingly, however, a decrease in anxiety and depression symptoms were not evident at the initial end of treatment, suggesting that treatment took longer to have an effect on these symptoms than the primary ADHD symptoms. The current study was designed to follow-up Emilsson et al.'s study but to address limitations that included a high amount of missing data, small sample size, and failure to compare results from the end of treatment with the 3-month follow-up.

Overarching Goal:

The investigators' aim was to examine the effect of treatment in adult ADHD on primary (ADHD) and secondary (depression and anxiety) symptoms. Specifically, they randomized a sample of 95 individuals who underwent either cognitive-behavioral therapy/medication (CBT/MED) or treatment as usual/medication (TAU/MED). Outcome measures were evaluated at treatment end and at a 3-month follow-up. They hypothesized that, compared with the TAU/MED group, the CBT/MED group would show significant improvement in the primary outcomes of ADHD core symptoms and illness severity, as well as secondary outcomes involving anxiety, depression, and quality of life.

Methods:

The investigators ran a parallel-group RCT drawing from an outpatient sample at the The National University Hospital of Iceland. Participants were randomly allocated to receive the CBT/MED or TAU/MED interventions, and tested at baseline, end of treatment, and 3 months post-treatment. Participants were included if they had a current ADHD diagnosis, had been on ADHD medication for at least one month, and were over 18. There were more female (62) than male (33) participants, and the mean ages of the groups were comparable in the mid-30's. Most participants were taking methylphenidate, and a smaller percentage taking atomoxetine to treat their ADHD. The majority of participants had co-morbid disorders (usually depression and/or anxiety) for which they were receiving some treatment.

As far as the CBT intervention, this involved the R&R2 (Reasoning & Rehabilitation) ADHD program, a 15-session manualized program that included 15, 90-minute sessions delivered twice-weekly in a group format, with a total of five different R&R2 ADHD treatment groups.

Primary outcomes were measured using the Kiddie-Schedule for Affective Disorders and Schizophrenia (K-SADS), ADHD section, the Clinical Global Impression (CGI), and the Barkley Current Symptoms Scale. Secondary outcomes were measured with the Beck Anxiety Inventory (BAI), Beck Depression Inventory (BDI), and Quality of Life Scale (QLS). ADHD diagnoses were confirmed at initial contact with a diagnostic interview to assess DSM-IV criteria.

Procedures:

Participants were randomly assigned to treatment conditions and the self- and clinician-rated evaluations were conducted at the three time points. The clinician-rated evaluations were all conducted blind to treatment group. Some participants in the TAU/MED group received non-pharmacologic interventions, but these were not conducted or recorded in any systematic way.

Results:

The authors found that the groups were generally well-matched at baseline, with the exception being that compared with the CBT/MED group, the TAU/MED group had a lower score on the Barkley Current Symptoms Scale hyperactivity/impulsivity score. Also, younger participants were significantly less likely to complete the assessment interviews by the clinician raters at the end of treatment. These variables were controlled for in the statistical analyses. Slightly over half of all participants (52%) completed the study to completion (3-month follow-up), so there was significant attrition with the study.

The authors found that participants in CBT/MED group improved significantly on all primary outcome measures relating to ADHD symptoms and illness severity compared with the TAU/MED group. Of the secondary outcome measures, the CBT/MED group was significantly lower only on the BDI, but the BAI was also very close to being statistically significantly different. The effect sizes were generally in the medium range for the primary outcomes; the BDI effect was somewhat smaller.

When the investigators examined change from the end of treatment to the 3-month follow-up, they found that, compared with the TAU/MED group, the CBT/MED group displayed continued improvement on all secondary measures over time. Effect sizes for these time effects were all in the medium range.

To illustrate these effects in terms that will be familiar to most readers, consider changes in the BDI. The CBT/MED group's mean score went from about 13, to 8, to 5 across baseline, end of treatment, and 3-month follow-up points; for the TAU/MED group, the scores changed from about 16, to 14, to 13. There were no differences from the end of treatment to the 3-month follow-up for any of the primary outcome measures, though the differences from baseline were maintained.

To sum up, then, by the end of treatment combined with 3-month follow-up results, the CBT/MED group displayed a significant reduction in primary outcomes relating to ADHD symptoms compared with the TAU/MED group. However, between the end of treatment and the 3-month follow-up, the CBT/MED group showed continued improvement in all secondary outcomes relating to anxiety, depression, and quality of life, but the TAU/MED group did not.

So what is the clinical meaning of these interesting results? First, these data suggest that CBT combined with medication is better at reducing both core ADHD symptoms and common co-morbid conditions (i.e., depression & anxiety) in adult patients than medication combined with treatment as usual. These findings are generally consistent with other published research showing that the addition of psychological treatments like CBT to medication in treating ADHD is better than medication alone. This research reinforces existing international guidelines that recommend a multimodal treatment approach combining pharmacological and psychological interventions in treating ADHD.

A second implication of these study results is that CBT used in a group format can positively impact comorbid conditions like anxiety and depression in ADHD; however, the impact on these symptoms appears to take more time than its impact on primary ADHD symptoms. The mechanism by which this process occurs is unclear. One possibility is that as primary ADHD symptoms are successfully treated, patients start to have fewer problems in their daily lives, so secondary symptoms start to subside. However, such a conceptualization does not explain why only individuals who receive CBT with medication continue to improve in these secondary symptoms but those treated solely with medication do not. There may be something learned in the process of CBT that takes time for effects to be realized as patients practice things learned in therapy in their everyday lives.

Young and colleagues' study has considerable methodological strengths, as previously mentioned. The chief limitation of this study (readily acknowledged by the authors) is the high rate of attrition from baseline to 3-month follow-up, nearly 50%. Although the authors use some sophisticated analyses to address whether the attrition occurred in any systematic way (for the most part, it did not), such high attrition is obviously not optimal. With that said, attrition was much less (between about 17% and 30% across measures) from baseline to the end of treatment. Therefore, a solid majority of participants completed the treatments, even if some did not attend the 3-month follow-up session. Another limitation of this study that may affect generalizability, is that the sample was disproportionately female (at roughly a 2:1 ratio) in contrast to the typical prevalence by sex of ADHD in the general population.

In summary, these study results suggest that clinicians should consider more readily recommending CBT in the treatment of ADHD, especially when comorbidities like anxiety and depression are present. In addition to CBT being effective in treating patients' primary ADHD symptoms, it may also impact these comorbidities, especially if sufficient time is given for the treatment to have maximal effect.

Dr. Peter Arnett received his Ph.D. in Psychology (Clinical) from the University of Wisconsin – Madison, and completed a post-doctoral fellowship in Clinical Neuropsychology at the Medical College of Wisconsin under the direction of Drs. Stephen Rao and Thomas Hammeke. He is currently a Psychology Professor and Director of Clinical Training at Penn State University. Dr. Arnett's research has focused on clinical neuropsychology, with an emphasis on studying secondary influences on cognitive functioning in persons with multiple sclerosis (MS) and mild traumatic brain injury. He is a fellow of the NAN, past winner of NAN's Nelson Butters Award for Research Contributions to Clinical Neuropsychology, was Program Co-Chair for the 2010 Mid-Year Meeting of the International Neuropsychological Society (INS), and is a board member of the INS. Dr. Arnett is the author of over 100 research articles and book chapters, and has edited a book entitled, *Secondary Influences on Neuropsychological Test Performance*. He is an editorial board member of several journals, and has received grant funding from the National MS Society, NIH, and NIMH.

Attention-Deficit/Hyperactivity Disorder (ADHD) and Anxiety Comorbidity: Implications for Clinical Practice

Matthew A. Jarrett, Ph.D. & Dane C. Hilton, M.A.
University of Alabama

Attention-deficit/hyperactivity disorder (ADHD) is highly comorbid with other psychiatric disorders, including the anxiety disorders (Jarrett & Ollendick, 2008). Population-based studies have shown that anxiety disorders occur in 25% of children with ADHD, and this rate is closer to 30-40% in clinic-referred settings (Jarrett & Ollendick, 2008).

So why do we see comorbidity between ADHD and anxiety? Tannock (2009) reviewed a series of hypotheses including: 1) attention problems may be secondary to an anxiety disorder, 2) anxiety may be the product of persistent demoralization related to ADHD, 3) the two disorders each have a distinct etiology and treatment response, and 4) the combination may be a distinct yet currently unclassified disorder with its own etiology and treatment response. Although the brief format of this piece limits our ability to review all of these areas, there is some evidence for unique treatment response and neuropsychological impairment that might require tailored intervention, so we will return to this topic at the end of this column.

In relation to Hypothesis 1, researchers and clinicians have often struggled with the view that attentional problems may reflect an underlying anxiety disorder rather than ADHD. In fact, DSM-5 Criterion E for ADHD states that the symptoms of ADHD should not be better explained by another disorder (e.g., an anxiety disorder). How does one differentiate between comorbidity and ADHD symptoms better explained by an anxiety disorder? The data to date suggest that while anxiety may be associated with elevated ADHD symptoms, specific ADHD cutoffs may be useful in differentiating ADHD + anxiety from anxiety alone. For example, Elkins, Carpenter, Pincus, & Comer (2014) utilized receiver operating characteristic (ROC) analyses to examine the diagnostic efficiency of the Child Behavior Checklist (CBCL) Attention Problems subscale for differentiating those with generalized anxiety disorder (GAD) from ADHD + GAD. The authors found that a cut score of 63 was most efficient. This finding is consistent with one of our published studies comparing children and adolescents with ADHD + anxiety, ADHD alone, and anxiety alone using the CBCL and Teacher Report Form or TRF (Jarrett, Wolff, Davis, Cowart, & Ollendick, 2012). Our study found that those with ADHD + anxiety and ADHD alone showed similar levels of Attention Problems (ADHD + anxiety = 72.24 for CBCL and 64.12 for TRF; ADHD alone = 70.73 for CBCL and 64.12 for TRF), but both groups showed significantly higher Attention Problems than those with anxiety alone (66.08 for CBCL and 60.00 for TRF). Finally, in a paper under review (Jarrett, Van Meter, Youngstrom, Hilton, & Ollendick, under review), we utilized ROC analyses in a large, clinic-referred sample to examine how the CBCL and TRF predicted the presence of ADHD diagnosis. Both measures predicted ADHD diagnosis, but the presence of anxiety did not moderate the relationship, suggesting that stringent clinical cutoffs for ADHD can be used independent of anxiety presence.

Prior to discussing clinical recommendations, we will briefly discuss the literature on neuropsychological functioning as it relates to ADHD and anxiety. In general, research in this area has been mixed. Some studies have found that children with ADHD + anxiety perform better on inhibitory control tasks (Manassis et al., 2000; Pliszka, Hatch, Borcherding, & Rogeness, 1993), while others have not supported or provided only partial support for this finding (Epstein, Goldberg, Conners, & March, 1997; Jarrett et al., 2012). Similarly, studies of sustained attention have found evidence for both enhanced sustained attention (Vloet, Konrad, Herpetz-Dahlmann, Polier, & Gunther, 2010) or little difference between children with ADHD + anxiety and anxiety alone (Jarrett et al., 2012). In relation to working memory, the evidence seems more consistent, with studies showing that ADHD + anxiety leads to greater working memory impairment (Jarrett et al., 2012; Skirbekk, Hansen, Oerbeck, & Kristensen, 2011). As noted by Tannock (2009), children with ADHD and anxiety may tend to perform worse on cognitively complex and mentally effortful tasks. Anxiety at moderate levels may serve to enhance vigilance and/or regulate impulses (or perhaps just not interfere with these processes) but may disrupt more cognitively effortful processes such as working memory (Tannock, 2009). More studies are needed, particularly examining state anxiety, since these neuropsychological impacts may be more prominent when anxiety is activated.

Finally, we will briefly touch on the latter portion of Hypothesis 4 (i.e., treatment response). The Multimodal Treatment of ADHD Study (MTA Cooperative Group, 1999) found that those with ADHD and ADHD with comorbid anxiety responded equally to behavioral intervention and medication, a finding which differed from the overall finding of better response with medication. Since this study, a handful of studies have examined behavioral treatment response in this subgroup, with findings supporting improvements in both ADHD and anxiety symptoms as a result of cognitive-behavioral interventions (CBT) for anxiety (Jarrett & Ollendick, 2012; Scibberas et al., 2015) and enhanced response to family-based vs. individual CBT for anxiety when ADHD is present (Maric, van Steensel, & Bogels, 2015).

In summary, anxiety disorders are associated with enhanced attention and working memory deficits, but the evidence to date suggests that stringent clinical cutoffs for ADHD can be utilized to differentiate ADHD, anxiety alone, and ADHD + anxiety. In addition, treatment recommendations may initially focus on parent training and/or cognitive-behavioral therapy for anxiety (preferably with family involvement), particularly in milder cases of ADHD and/or younger children, prior to pursuing stimulant medication treatment. Finally, there is some evidence that stimulants do not improve working memory deficits for those with ADHD + anxiety (Bedard & Tannock, 2008), so it may be that additional treatment options are needed to remediate these deficits. Emerging research has examined interventions for executive functioning including cognitive training, mindfulness mediation, physical exercise, and approaches that integrate physical exercises and cognitive control (e.g., Taekwondo; Diamond & Lee, 2011). These low-risk interventions have the potential for high reward, so we encourage practitioners to consider these complementary interventions for patients with ADHD and anxiety, particularly interventions that do not require significant financial investment (e.g., mindfulness and physical exercise).

Clinical Take Home Points:

1. ADHD and anxiety co-occur in approximately 25% of children and adolescents in the population, and this rate of comorbidity is even higher at 30%-40% in clinic settings.

2. Although anxiety may be associated with enhanced attention problems, ADHD and anxiety can be diagnosed concurrently when stringent cutoffs are used for ADHD diagnosis.

3. Given some evidence for enhanced treatment response to behavioral therapy, treatments such as parent training and cognitive-behavioral therapy for anxiety might first be considered prior to a trial of stimulant medication, particularly for cases with milder ADHD symptomatology.

Dr. Matthew Jarrett received his Ph.D. in Psychology (Clinical) from the Virginia Polytechnic Institute and State University, and completed a predoctoral internship at Children's National Medical Center. He is currently an Assistant Professor in the Department of Psychology at the University of Alabama. Dr. Jarrett's research and clinical interests are in the field of developmental psychopathology, particularly in the areas of attention-deficit/hyperactivity disorder (ADHD) and anxiety disorders. His current research explores the interface of neuropsychological functioning and co-occurring symptomatology in children, adolescents, and emerging adults with ADHD. He regularly publishes in journals such as *Clinical Child and Family Psychology Review*, *Clinical Psychology Review*, *Journal of the American Academy of Child & Adolescent Psychiatry*, *Journal of Attention Disorders*, *Journal of Child Psychology & Psychiatry*, *Journal of Clinical Child and Adolescent Psychology*, *Journal of Consulting and Clinical Psychology*, and *Psychological Assessment*. He is an editorial board member of several journals, and has received grant funding from the National Institutes of Health.

Dane Hilton is a doctoral student in Clinical Child Psychology at the University of Alabama. He is currently engaged in multiple projects examining interventions for executive functioning that include aspects of cognitive training, physical exercise, cognitive control, and mindfulness practices. He is primarily interested in the connection between executive function and social interaction in children and adolescents.

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Lifestyle Factors and ADHD: The Positive Role of Physical Activity

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Research examining the effects of lifestyle factors on cognitive health is burgeoning. For example, a growing literature indicates that intellectual engagement, social activity, and dietary factors are all linked to stronger cognitive abilities. To date, the most widely researched lifestyle factor is physical/aerobic activity. While there is growing consensus that exercise can improve brain functioning, cognition, and emotional regulation in healthy individuals across the lifespan, less is known about the effects of exercise on clinical populations. In particular, our understanding of the role of exercise on Attention-Deficit/Hyperactivity Disorder (ADHD) symptoms is at an early stage, although some meaningful work has been done in this area and will be reviewed here.

ADHD is a neuropsychiatric disorder characterized by three primary symptom clusters: inattention, hyperactivity, and impulsivity. ADHD is typically diagnosed in childhood, and parents often ask clinicians about non-pharmacological options for managing a child's ADHD symptoms. While medication-based treatment of ADHD remains the most common treatment modality, evidence indicates that psychosocial treatments can also be quite effective[1], particularly in individuals with mild-to-moderate symptoms.[2]

The value of physical activity as a treatment for ADHD symptoms has emerged as a compelling therapeutic option given that aerobic activity positively impacts multiple brain regions, neurotransmitters, and neuromodulators known to be negatively impacted in ADHD.[3] In humans and in animal models, exercise has been found to have wide ranging cellular, structural, functional, and cognitive benefits. These include enhanced frontal lobe volume, executive functioning, BDNF levels, cerebral blood flow, and dopamine and other monoamine modulation.[4]

Existing studies examining effects of physical activity on ADHD have generally studied children and adolescents, with some emerging work in adults with ADHD. This research generally comes in three forms: 1) examining self-reported or pedometer/accelerometer-assessed physical activity levels vis-à-vis cognition and other outcomes; 2) considering the effects of acute exercise on ADHD; and 3) studying activity training program effects on ADHD symptoms. Examples of research from these three lines of inquiry will be discussed below.

Some work has clarified associations between daily activity levels and cognition in ADHD. For example, boys with ADHD who engaged in more consistent moderate-to-vigorous physical activity over a 7-day period (as assessed with an accelerometer) showed better planning and, to a lesser extent working memory and inhibitory control.[5] Other work in adolescents with ADHD has shown that reduced physical activity is associated with depressed affect, particularly in those with more hyperactivity.[6] In adults with ADHD, there is preliminary evidence that individuals who report more frequent physical activity experience reduced impulsivity, worry, and intrusive thoughts.[7]

We are also beginning to understand the effects of acute bouts of exercise on ADHD symptoms. Acute exercise has known cognitive and emotional benefits in healthy controls, and similar findings are emerging in ADHD. Some evidence indicates that acute high intensity physical activity can improve sustained attention independent of stimulant treatment.[8] Chang et al. (2012) examined the effects of moderate intensity aerobic exercise on executive functioning in ADHD.[9] Their work indicated that relative to controls, children with ADHD showed improved performance on measures of inhibitory control and novel problem solving after 30 minutes of treadmill running. They proposed that these findings could be explained by increased dopamine release and enhanced dorsolateral prefrontal cortical activity. Other work has found that moderate-intensity treadmill exercise positively impacts inhibitory control, academic aptitude (reading comprehension and arithmetic), and regulatory processes in ADHD as measured by event-related brain potentials.[10] A recent study examined effects of a 30-minute period of exercise on a recumbent cycle in boys and girls with ADHD. Exercise showed notable effects on processing speed and inhibitory control (but not planning) in children with and without ADHD.[11] Interestingly, even 5 minutes of vigorous exercise has been found to improve response inhibition in boys with ADHD.[6]

Multiple types of exercise programs have also been found to have positive effects on ADHD symptoms. Smith et al. (2013) examined the effects of eight weeks of 26 minutes/day of moderate to vigorous physical activity in various forms in early elementary school students.[12] Exercise was found to particularly influence response inhibition as well as provide broader cognitive, motor, social, and behavioral gains. A recent study considered the cognitive benefits of multiple exercise programs examined simultaneously relative to a passive control group. ADHD children were assigned to two groups: one focusing on balance, ball handling, and manual dexterity training, the other focused on training of multiple sports (swimming, wrestling, climbing, gymnastics). Children in both physical activity groups showed improved verbal working memory performance relative to controls, but neither activity focus was better than the other from a cognitive standpoint.[13] Other exercise programs, such as table tennis exercise and aquatic exercise, can also positively impact motor skills, executive functions, and resting EEG patterns in children with ADHD.[14-16]

Based on extant research, there appears to be a moderate amount of evidence supporting the positive role of exercise on ADHD. That said, while general benefits of acute exercise on ADHD symptoms are increasingly accepted, it remains unclear what duration of acute exercise has the most optimal effect on cognition, and whether some cognitive abilities (particularly executive functions) are more consistently impacted than others in ADHD. Future work should also clarify ideal durations of exercise programs on ADHD symptoms, and whether there is a

dose-response relationship for physical activity effects on ADHD. An additional question relates to the therapeutic value of acute/chronic exercise versus psychostimulant or other medication in ADHD treatment. Head-to-head clinical trials in this regard would be particularly useful.

In summary, there is a growing body of research indicating positive effects of acute aerobic activity and longer-term activity on neuropsychological function in ADHD. While specific recommendations regarding frequency and intensity of exercise in ADHD have not been established,[17] there is growing consensus that regular exercise engagement is a powerful non-pharmacological treatment for management of ADHD symptoms and promotion of cognitive health.

Clinical Take Home Points:

1. Exercise has been found to reduce ADHD symptoms and improve executive functioning, particularly in children.
2. In the context of promoting cognition in ADHD, specific types of physical activity do not appear to be as important as consistently engaging in some form of exercise.
3. Clinicians should consider prescribing exercise as a behavioral treatment for ADHD.

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Feigned Adult ADHD

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Attention deficit hyperactivity disorder (ADHD) is a neurodevelopmental disorder characterized by pervasive symptoms of inattention, impulsivity, and hyperactivity. A wealth of research has shown that symptoms may persist well into adulthood for as many as half of children with the diagnosis,[1,2] with estimates suggesting a prevalence of about 2.5% of adults in the general population.[3]

There has been a considerable increase in adults seeking evaluation and treatment for ADHD. For example, in a study of insured, employed persons and their dependents in a US health care claims database, the prevalence of ADHD increased three-fold from 2002 to 2007, with the largest increase among 18-24 year olds.[4] The reason for this is unclear, but may reflect greater recognition of ADHD symptoms by clinicians, increased rates of self-identification among individuals in the community, heightened media attention, or more aggressive marketing of pharmaceutical treatments for the disorder.

Another potential contributor is feigning of ADHD. Common incentives for doing so include obtaining academic/work accommodations or social security disability, or accessing stimulant medications to improve cognitive performance, for recreational use, to increase energy, to lose weight, or to sell for profit.[5] According to some estimates the prevalence of feigned ADHD is approaching the base rate of malingering in personal injury litigation.[6] For example, almost half of college students self-referred for evaluation of ADHD showed evidence of symptom exaggeration or fabrication in one study.[7] In a community survey of 4,297 adults aged 18 to 49 years, almost 20% of past-year nonmedical users of stimulants reported fabricating symptoms or sought out health care providers who were known to "not ask too many questions" to prescribe the medication.[8]

Low thresholds for making an ADHD diagnosis can have unintended negative consequences such as providing medically unwarranted access to controlled substances, undermining the principle of equal opportunity in academic settings, and enabling fraudulent disability claims. Therefore, non-credible presentation must be ruled out during the clinical assessment of ADHD, especially in the presence of identifiable external incentives for obtaining a diagnosis.

Rating Scales

In most clinical settings, including primary care, diagnosis is based on the use of a self-report ADHD rating scale along with a clinical interview.[9] The transparency of this method allows clinicians to evaluate the correspondence between the examinee's symptom endorsement and DSM diagnostic criteria quickly and reliably. However, relying exclusively on self-report of face valid symptoms makes the assessment vulnerable to feigning. As diagnostic criteria are publicly available, a motivated individual can learn how to successfully feign ADHD with minimal investment. Our cursory internet search using the phrase "how to fake adult ADHD" yielded numerous links that describe the symptoms in sufficient detail to meet DSM criteria, and provide advice on how to convince a clinician that one has the disorder.

Unfortunately, while non-credible examinees tend to endorse higher levels of ADHD symptoms than those with genuine ADHD, this group-level difference cannot be used to discriminate valid and invalid symptom reports at the individual level.[10] The use of self- or parent-report rating scales is further complicated by mixed findings with respect to the accuracy of retrospective recall of childhood symptoms.[11,12] Furthermore, endorsement of symptoms (especially inattention) is commonly found in association with a variety of etiologies such as depression, PTSD, substance abuse, or other psychiatric disorders.[13]

A further limitation of many adult ADHD rating scales is that the credibility of self-reported symptoms is not typically evaluated. A recent attempt to develop a validity index for an existing measure produced promising results, which are awaiting replication.[14] There is also relatively little research evaluating whether symptom validity measures in existing ADHD scales are adequate for discriminating between credible and non-credible response sets.[15] Thus, while rating scales can be helpful in the clinical evaluation, the cumulative evidence suggests that they are susceptible to different kinds of response bias, and therefore, should not be used as the only tool for diagnosing ADHD.

Performance-Based Measures

Adults with ADHD commonly show deficits on performance-based tests of executive functioning, attention, processing speed, and episodic memory. Neuropsychological assessment can inform differential diagnosis, identify patterns of cognitive strengths and weaknesses, and guide recommendations for compensatory strategies and treatment in adults with the disorder.[17] However, current neuropsychological tests lack sufficient specificity to diagnose adult ADHD, nor are they sensitive to feigned ADHD.[15]

The presence of failed performance validly tests (PVTs) is more effective at differentiating between genuine and feigned ADHD than rating scales.[10] Some PVTs embedded within cognitive tests, such as continuous performance tests, are also promising, though findings have been inconsistent.[15] It is important to note, however,

that classification accuracy varies across instruments, cutoff scores, samples, and criterion measures. Individual PVTs produce good specificity (>.90) but highly variable sensitivity (.10-.80). The widely accepted forensic standard of two or more PVT failures marking invalid performance has been successfully applied to the detection of feigned ADHD with high specificity (.90-1.00).[15-16]

Summary

There are growing concerns about the validity of using self-report symptoms in isolation for diagnosing adult ADHD, especially given societal implications when the disorder is successfully feigned. Clinicians should consider adopting a more guarded approach to the evaluation of adults presenting for evaluation. Developing a practical and empirically supported assessment model to address this dilemma is an active area of clinical research that has begun to produce promising results.[17] In the meantime, a comprehensive evaluation that combines clinical interview, rating scales from patient and parent, and neuropsychological assessment including several PVTs appears to be the best approach to the evaluation of adult ADHD.

Clinical Take Home Points:

1. There are several incentives for adults to feign ADHD, such as academic/work accommodations and access to stimulant medications, and estimates of base rates for feigned ADHD are on the rise.
2. Adult ADHD self-report rating scales are insufficient for differentiating between credible and non-credible presentation.
3. Using multiple performance validity tests provides greater accuracy in detecting feigned ADHD.
4. A multi-method evaluation approach including rating scales, multiple performance validity tests, and neuropsychological measures is likely to prove most helpful in clinical assessment, including detection of feigned ADHD.

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Diffusion Modeling in ADHD: A Brief Introduction and Application for Clinical Practice

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Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder that affects 3-7% of children in the United States, and is characterized by extreme and age-inappropriate difficulties with attention, hyperactivity, and impulsivity (American Psychiatric Association, 2013). In addition to the psychological costs that ADHD places upon children, parents, teachers, and communities, the estimated aggregate annual treatment costs for the disorder is $8 billion dollars across the heath/mental health sectors, and is close to $14 billion dollars for the educational sector (Pelham, Foster, & Robb, 2007). As a field, it is therefore critical that we not only continue to identify the underlying causes and cognitive mechanisms that drive the disorder, but also work to provide researchers and clinicians with the most valid methods by which those mechanisms can be measured. Ultimately, the goal is to move diagnosis of the illness away from reliance on behavioral symptomology and towards a mechanism-based nosology and functional-deficit approach to assessment.

Of the putative etiologic mechanisms, deficits in executive function (EF) are perhaps the most well-known, and are implicated in 30-50% of children diagnosed with ADHD (Nigg, Willcutt, Doyle, & Sonuga-Barke, 2005). However, originally designed to detect frank brain injury, traditional neuropsychological tests of EF tend to tap multiple component processes. While no task is process-pure, clinical science's more recent adoption of computer-based, empirically-supported models and paradigms of cognitive control from the cognitive sciences (e.g. go-no-go, continuous performance tasks, working memory span tasks, flanker tasks, etc) has allowed researchers to more easily identify the neural networks and areas of localization involved in the disorder. That being said, currently, the vast majority of the most well-validated measures EF in both research and clinical practice use mean reaction time (RT) or mean accuracy as a primary outcome variable. This is problematic for two reasons. First, as two descriptors of a single response, RT and accuracy are produced simultaneously and are non-independent. However, the standard in the field is that either one or the other is selected for analysis, even if this leads to important differences in interpretation depending on the variable selected. For example, one may as a rule, tend to emphasize accuracy in responding over speed. But, if RT is used as the dependent variable for that particular paradigm, then such performance would be interpreted as impaired. Or vice versa. So, considering RT and accuracy separately provides at best an incomplete understanding of performance, and at worse, erroneous interpretations of data. Second, RT is multiply influenced: by the efficiency with which information is accumulated to make a decision, which is typically the construct of interest (e.g. "do I go or not go?" "is this a word or non-word?"), but also by the amount of time needed to encode a stimulus; to prepare and execute a motor response; and whether one tends (or has been instructed) to emphasize speed over accuracy, or vice versa) (Figure 1). These associated processes ultimately reduce the sensitivity of RT measures to reliably detect individual differences on the core construct of interest.

Although clinicians often "eyeball," or informally take differences in speed/accuracy into some consideration during interpretation, it is clear that an empirically-supported method is needed to reliably and rationally incorporate both error rate and RT into a single set of performance indicators. A well-known and well-validated computational method called diffusion modeling may present a solution (See White, Ratcliff, Vasey, & McKoon, 2010 for an excellent introduction and argument for this technique). Commonly used in cognitive research in college aged adults, diffusion modeling has also more recently been validated in developmental, aging, and clinical populations, most notably ADHD and anxiety disorders.

Diffusion Modeling

The diffusion model can be used for any tasks requiring simple two-choice decisions. There are three primary parameters, or variables, that describe performance. First, "drift rate" represents the *rate* at which an individual is able to make a decision. Here, larger is better/faster. Second, "boundary separation" refers to the relative *amount* of information a person requires prior to making a decision. Requiring more information (i.e. having wider boundaries) will result in slower but more accurate choices, while requiring less information produces faster, but more error-prone responses. And third, "non-decision time" represents the time it takes to encode a stimulus and the time it takes to prepare the motor response once a decision is reached. These variables are obtained by fitting the observed RT distributions for correct and error responses, to the RT distributions that are predicted by the model. Using an initial set of parameter values, predictions are derived and then the values of the parameters are adjusted using an automatic routine that computes the goodness of fit, and then replaces the worst fitting parameter values with new ones. By this method, the model ultimately produces the best fit to the data. The best fitting set of parameter values are then used as indices of the latent psychological processes that each parameter represents (i.e. cognitive processing efficiency, speed-accuracy trade off settings, and the time to encode/prepare a motor response).

Diffusion Modeling in Research

Because the diffusion model makes full use of multiple dimensions of the data—the shape of the RT distribution for correct and incorrect responses—rather than relying on just mean RT or mean accuracy, it is able to yield a more complete picture of performance. As such, it is able to go beyond telling us if someone is slow, to explaining what step in the flow of information processing is the cause of slower RTs. For example, in aging populations, the diffusion model has been used to demonstrate

that slow RTs in that population are not due to a slowing of drift, as might be assumed, but are instead because healthy aging is associated with slower non-decision times (i.e. motor preparation) and to wider boundaries (i.e. valuing accuracy over speed) (Ratcliff, Thapar, & McKoon, 2001). Studies of children with ADHD have consistently found slower drift rates relative to typically developing controls (Karalunas, Geurts, Konrad, Bender, & Nigg, 2014), and that slow drift rate is not only responsible for the slower and more variable RTs observed among children with ADHD, but can also account for impairments in working memory, motor disinhibition, sustained attention, and error monitoring (Huang-Pollock, Karalunas, Tam, & Moore, 2012; Huang-Pollock et al., in press; Karalunas & Huang-Pollock, 2013; Weigard & Huang-Pollock, in press). The diffusion model allows us the opportunity to become independent of the complex and homuncular EF construct. Rather than asking why children with ADHD have poor accuracy on tasks of WM capacity, make more failed inhibits on a go-no-go-task, and are slow and variable to detect targets on a continuous performance task, we may instead look more comprehensively across tasks and ask: why are they slower, more variable, and error prone?

Diffusion modeling in clinical practice

This comprehensive approach to task performance is consistent with the process approach used in clinical assessment, and has the potential to improve upon our current efforts to evaluate cognitive deficits and treatment response. However, translating this tool from research to clinical practice requires test developers to be aware of this problem, so that large representative normative values for the diffusion model parameters can be derived. Once developed, normative values for these parameters may prove to be an invaluable component of clinical neuropsychological assessments and research. For example, the implications of a medication that improves reaction times while increasing error rate is strikingly different than one that improves both reaction time and error rate. As another example, the utility of a rehabilitation program that reduces RTs through an improvement in drift rate, would be quite different than one that reduced RTs through speeding motor preparation.

ADHD is the prototypical childhood psychiatric disorder associated with cognitive performance deficits. Because of this, new tools and insights into how cognitive deficits can be measured and monitored have broad application for any number of neuropsychiatric disorders, for initial assessment purposes, and for the evaluation of treatment outcomes, with implications well beyond ADHD itself.

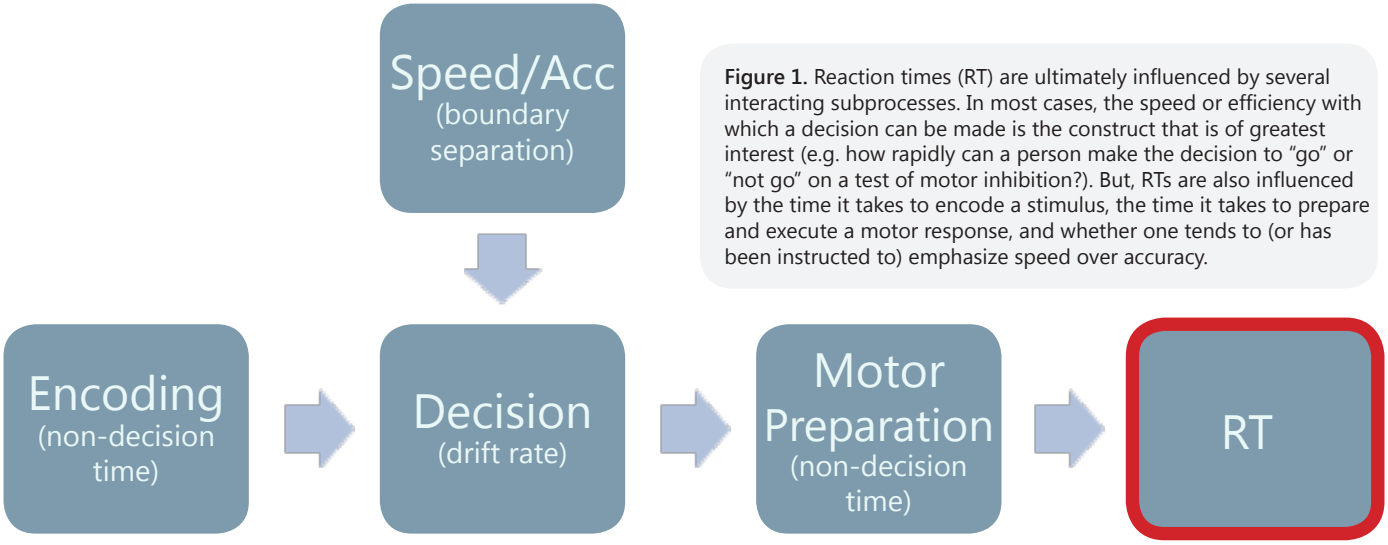

Figure 1. Reaction times (RT) are ultimately influenced by several interacting subprocesses. In most cases, the speed or efficiency with which a decision can be made is the construct that is of greatest interest (e.g. how rapidly can a person make the decision to "go" or "not go" on a test of motor inhibition?). But, RTs are also influenced by the time it takes to encode a stimulus, the time it takes to prepare and execute a motor response, and whether one tends to (or has been instructed to) emphasize speed over accuracy.

Clinical Take Home Points:

1. **Depending on mean RT or mean accuracy alone can easily lead to erroneous interpretations of performance.**
2. **The diffusion model represents a computational approach that utilizes the shape of the distribution for error and correct responses, to derive a set of parameters that can be used in a process-based approach to ask why a certain pattern of performance was obtained.**
3. **Standardized normative values for diffusion modeling (DDM) should be developed to effectively measure each component of the flow of information processing.**

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Cynthia Huang-Pollock, Ph.D. graduated from Michigan State University and completed her internship and postdoctoral fellowship at the University of California, San Francisco. She is currently an Associate Professor in Psychology at the Pennsylvania State University. Her area of expertise is in the application of cognitive models of psychological processes to uncover the links between underlying biology and the development of psychopathology. She had been funded by the NIH/NIMH and currently serves as a principal member of the Institutes for Educational Sciences (IES) Basic Processes research study section.

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How We Can Make Neuropsychology Relevant to the Public

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"As far as the laws of mathematics refer to reality, they are not certain; and as far as they are certain, they do not refer to reality."
-Albert Einstein

Although Albert Einstein may have meant for something very different in the above quote, to me it represents the limitations of a social science that solely depends on numerical findings. Neuropsychology is unique in the sense that it uses the integration of measurement data with astute clinical judgment to produce recommendations that fit reality.

Neuropsychological evaluations must consider a multitude of factors given the complexity of the human condition. An ancient saying describes further the nature of this complexity: "A person is a whole world; when you destroy a person, you destroy a world. When you build a person, you build a world." While neuropsychological evaluations require immense professional responsibility for accuracy and relevance, they often have the potential to significantly improve clients' lives. The latter can be achieved further with public education. Using our expertise, we can increase the public's understanding of various conditions that neuropsychologists assess and treat and help our clients make informed decisions.

Many clinical neuropsychologists may find that it takes years for a client in need of neuropsychological services to present for an evaluation. A multitude of reasons may contribute to this phenomenon: treating physicians may not know how to identify which clinical cases can benefit from a neuropsychological evaluation; treatment centers and schools may not be trained to identify symptoms that may indicate a neuropsychological problem; clients do not know what a neuropsychologist does and what a neuropsychological evaluation has to offer; and financial factors, such as relatively high costs of assessment and lack of insurance coverage. While academic development and legislative activities make strides in the professional map, reaching out directly to the layman through publicly available mediums of communication, such as the internet, radio, television, and magazines, invites various populations in need to discover what neuropsychology can do for their health and wellbeing, and provides direct exposure to basic but often necessary information. Furthermore, by having clinical and research experts providing basic knowledge and answering common but essential questions, we serve to reduce the tremendous confusion that the layman may experience when bombarded by the internet's flow of unprofessional, unsubstantiated, misleading and even frightening information. Guided by inaccurate information, individuals may attempt to self-diagnose and subsequently base important life decisions on this self-diagnosis; they may choose all kinds of therapies that would not benefit their condition or, in worse circumstances, cause harm; they may feel undue stress, anxiety, depression, or despair; they may spend their often limited funds on ineffective therapies, hoax treatments, and unsubstantiated care programs; and they may waste valuable time and cognitive "windows of opportunities" during which they could have been treated with therapies that are designed specifically to treat their condition and are supported by clinical practice and research findings. Perhaps most importantly, these individuals are at risk of losing hope and faith that effective treatments exist for their condition, thereby depleting the most important resource they have – their internal mechanism of hope and endurance. Combating the flow off erroneous information and mitigating these very real "costs" is our collective responsibility as professionals who are committed to protecting our clients and serving to advance their wellbeing.

A large number of our "potential" clients may not be able to afford meeting with a neuropsychologist to receive basic information that can assist them in making simple decisions toward better care. As one solution, simple questions such as, "Should I see a psychologist, a neuropsychologist, or a psychiatrist?" can be easily explained via media platforms. Providing a general review of a particular specialty within neuropsychology, such as sports concussions, would be a relatively simple (and arguably enjoyable) task for the expert neuropsychologist and simultaneously valuable to the general public who can be misinformed by movies and shows that seek to sensationalize medicine and health. Furthermore, recent APA member polls have found that the public attributes value to public and media education activities, and wants more of them.[1]

The above rationale sparked my interest in creating a direct relationship with the public via the most popular and fastest growing media platform, internet radio. The format focuses on psychoeducation primarily in neuropsychology and other areas of psychology and wellbeing, such as maintaining a healthy brain. While my desire to broadcast admittedly began in my teen years with a rather odd high school radio show that I suspect received only partial attention from sleepy students entering classrooms at 7am, it took professional form years later in today's weekly production on air. About two years ago, I researched and could not find an on-air, live show that focused on neuropsychology, the brain, and wellbeing. To my pleasant surprise, the show was welcomed by thousands of listeners who are thirsty for knowledge, expert opinion, and motivational psychology. I also discovered that expert neuropsychologists and psychologists were

glad to share their knowledge with the public and communicate directly with the populations they serve.

Seven guidelines in effective public education emerged as I continued my experiment on air: 1. The content must be professional and psychoeducational – most importantly by providing access to experts; 2. Although it is necessary to cover a variety of topics in psychology and wellbeing, content should include a focus on the brain and psychology - mechanisms, disorders, and concepts, and how those effect behavior and functioning; 3. Content should address current topics and trends, which are sometimes requested by the group of listeners; 4. Discussions should be styled with a positive, holistic, and motivational approach; 5. Information should be aligned with commonly accepted trends in the field in the event that those are established, or alternatively mention various controversies or limitations; 6. Level of communication should be maintained as simple, clear, and useful/practical; 7. The media platform used should allow for the layman to communicate their interests, on and off air.

Responding to layman questions on air often requires emotional validation, basic education, normalization, and boundary setting. A primary goal is to be practical, give clear advice, and provide sources of information. Lengthy discussions on research findings quickly lose the interest and engagement of the listener. An exploratory conversation is often a successful bridge between fear and reality. Boundary setting is important to establish the parameters of online and offline engagement but also bind the conversations to avoid unrelated topics and points of view that do not center on psychological and neuropsychological issues. Politics and policies are rarely comment-resistant; however, it is the human welfare question that discussion should revolve around.

In sum, clinical and academic neuropsychologists have significant knowledge that is used every day in various settings to enhance patients' health. Disseminating this knowledge in media platforms makes it more accessible and provides open and direct relationship with the populations we serve. While APA's public education campaign began in 1996,[2] public education in neuropsychology has recently become more prominent as an official mission of the National Academy of Neuropsychology Foundation. Under the leadership of the first and second chairmen, Drs. Ruben Echemendia and Jeff Barth, the NAN Foundation produced valuable projects such as educational videos in the topics of sports concussions and dementia and a children's brain health educational program. Most recently, Dr. Jerid Fisher has been voted the third chairman of the board, currently leading the development of the Foundation website that will become a go-to source of information for the general public about brain health and brain issues.[3]

Embracing the recent APA initiative to increase public education and supporting the growing projects of the NAN Foundation are efforts necessary to decrease public confusion and increase treatment accessibility,[4] thereby improving the lives of the people we treat. The NAN Foundation seeks to encourage the participation of NAN members in the activities of the Foundation and we look forward to hearing your thoughts and ideas in public education. Please feel free to reach out to us at NANF4Health@gmail.com.

Drorit Gaines, Ph.D. received an academic excellence scholarship to UCLA and completed a Bachelor's Degree in Business Economics and Accounting. She received her Ph.D. from Fielding Graduate University in Clinical Psychology with specialization in Clinical Neuropsychology and completed post-doctoral experience in neuropsychology at the Veterans Affairs of Greater Los Angeles and UCLA Longevity Center. She is currently a Principle Investigator at the VA West Los Angeles, a volunteer clinical faculty in the UCLA Department of Pediatrics, and in private clinical practice. Dr. Gaines is the executive producer and host of the first neuropsychology on air universal broadcasting weekly online radio show. Dr. Gaines received the American Psychological Association Early Career Professional Award (2015); Best Abstract, Society of Nuclear Medicine and Molecular Imaging, and Selected to present at the 2015 Sino-American Conference, Shanghai, China (2015); Sponsorship of young leadership in Neuropsychology, National Academy of Neuropsychology Women in Leadership (2014); Exceptional Contribution Award, Veterans Affairs of greater Los Angeles (2013); and Best Dissertation Abstract, Fielding Graduate University (2012). Dr. Gaines serves as an expert reviewer for several journals and has authored several publications and presentations. She is a Board member of the NAN Foundation and Co-Chair of the Media and Fundraising committees, and a Board member of the Los Angeles County Psychological Association and Chair of Public Education Committee.

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Success Stories: The IOPC and 360 Degree Advocacy

Alice Ann Holland, Ph.D. & Beth C. Arredondo, Ph.D.
NAN Legislative Action and Advocacy Committee

The Problem

Advocacy, particularly around professional practice issues, is difficult for any one organization to effectively perform due to differences in state, regional, and national healthcare funding and regulations.

The Solution

The IOPC created the 360 Degree Advocacy Model to coordinate and streamline national practice advocacy efforts. See below for a detailed example.

The Inter-Organizational Practice Committee (IOPC)

- Established in 2012
- Consists of representatives from:
  - National Academy of Neuropsychology (NAN)
  - Society for Clinical Neuropsychology (SCN, Division 40 of APA)
  - American Academy of Clinical Neuropsychology/American Board of Clinical Neuropsychology (AACN/ABCN)
  - American Board of Professional Neuropsychology (ABN)
  - APA Practice Organization (APAPO)

360 Degree Advocacy Model

- Individual practitioners and/or state, regional, or national organizations alert an IOPC member organization of an issue requiring advocacy efforts
- Local committees discuss and decide to refer the issue to the IOPC
- The IOPC recruits a 360 Degree Advocacy team, typically including:
  - The individual neuropsychologists who brought up the issue
  - State/regional organization leaders
  - Individuals who have successfully advocated for similar issues
  - IOPC representatives
- The 360 Degree Advocacy team provides national support to local advocacy efforts

One Success Story:

The Issue

- In June 2013, the regional Medicare carrier for Florida, Puerto Rico, and Virgin Islands announced new restrictions to reimbursement for the administration of certain mood and personality measures by neuropsychologists, as well as reimbursement for feedback sessions.

360 Degree Advocacy

- Local neuropsychologists contacted their national organizations, who alerted the IOPC.
- The IOPC developed a 360 Degree Advocacy Team that included individuals who had played a role in successful advocacy efforts regarding similar issues with Medicare carriers.
- The Team coordinated letters from the IOPC, state/regional organizations, and individual neuropsychologists to the regional Medicare carrier.
- Later in 2013, the regional Medicare carrier made significant changes in favor of neuropsychology, referencing the IOPC in some of their comments.

Dr. Alice Ann Holland is the Research Director for the Neuropsychology Service at Children's Medical Center Dallas (CMCD) and is the neuropsychologist for the CMCD Center for Cancer and Blood Disorders. She also is an Assistant Professor in Psychiatry at the University of Texas Southwestern Medical Center. Dr. Holland heads an active clinical research program investigating genetic and intrapersonal factors influencing neurocognitive outcomes in medically complex children, adolescents, and young adults, with a particular focus on pediatric oncology and rare brain diseases. In addition to oncology, her clinical interests include rare conditions such as empyema, ospoclonus-myoclonus, and infrequent genetic disorders. Dr. Holland has been the recipient of numerous awards from organizations including the American Psychological Association, American Academy of Clinical Neuropsychology, National Register of Health Service Providers in Psychology, Texas Psychological Association, and Dallas Psychological Association.

Beth C. Arredondo, Ph.D., ABPP-CN, directs the Neuropsychology Lab at Western State Hospital in Staunton, Virginia, a training site in the University of Virginia/Western State Hospital postdoctoral residency in Clinical Neuropsychology. She completed her doctoral training at Sam Houston State University and internship and postdoctoral training at the University of Massachusetts. Clinical and research interests include psychological and neuropsychological assessment and treatment of patients with comorbid neurological and psychiatric illness and the utility of neuropsychological assessment in criminal forensic settings. She has been a member of the NAN Legislative Action and Advocacy Committee since 2010 and currently serves as co-chair.

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