This is a visualization of a functional connectome, a network of brain connections generated using functional magnetic resonance imaging (fMRI). Each lobe of the brain is color-coded and brain regions are represented by spheres (left hemisphere) and cubes (right hemisphere). The lines demonstrate the whole-brain functional connectivity of a heteromodal region at the temporoparietal junction. The image was created using the connectome visualization tool, NeuroCave (Reference: Keiriz JJG, Zhan L, Ajilore O, Leow AD, Forbes AG. NeuroCave: A web-based immersive visualization platform for exploring connectome datasets. Netw Neurosci. 2018;2(3):344-361.)
A new fully digital test that provides a fair and accurate assessment of receptive vocabulary ability for both English speakers and English learners.

- Easy, visually engaging, and standardized administration
- Can be used with any child or youth no matter what their first language is
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## Contents

**Co-Editors Welcome to the Next NAN Bulletin**  
By Lana Harder and Shawn M. McClintock  
5

**Universal Test Scores**  
By Veronica Bordes-Edgar  
6

**Comparing Neurocognitive Screening and Comprehensive Assessment**  
By Mathew J. Summers, Mark W. Bondi, and Stephen C. Bowden  
8

**Securing a Clinical Internship**  
By Brittney Otruba and Patricia Garcia  
13

**Securing a Postdoctoral Fellowship**  
By Victor Del Bene, Miguel Arce Renteria, and Seth A. Margolis  
16

**Pop Quiz – Test Your NAN Knowledge**  
19

**Concussion 101**  
By Nyaz Didehbani and Marsha Siebenmorgen  
20

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**Clinical Research Grants Program**

NAN is committed to the professional and scientific development of clinical neuropsychology. The mission of the Clinical Research Grants Program is to support meritorious small grants, pilot projects, or seed grants that address the value, worth, or efficacy of clinical neuropsychological assessment or interventions. These projects might be overlooked by traditional granting agencies because of their applied clinical nature or stage of development.

**Instructions for Completing NAN Grant Application:**

- Download Application & Submission Guidelines at www.nanonline.org
- Follow all page requirements/limitations
- Prepare NIH biosketch
- If postdoctoral fellow, primary mentor needs to complete letter of support
- Sign all forms
- Create one PDF document for entire application
- Email application on or before deadline (July 1, 2019) to: NANGrants@nanonline.org

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**2018 Recipients**

**Common Data Elements in Neuropsychology**

Lucia Cavanagh, Ph.D. | UCLA Semel Institute

**Comparing Neuropsychological Test Scores from the NIH Toolbox to Gold-Standard Cognitive Measures in Socioeconomically Diverse Older Adults**

Rebecca K. MacAulay, Ph.D. | University of Maine
Explore the most current neuropsychology assessments

Using the most up-to-date assessments can help ensure you have an accurate diagnosis and effective treatment plans. In order to provide you with the most updated tools, we’ve revised a number of our trusted neuropsychological assessments for you this year.

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Determine if a child is on track developmentally or if further, more comprehensive assessment is needed

For more information about these, and all of our other new products and services, visit PearsonAssessments.com
Dear NAN Community,

Have you missed the Bulletin? As your new Co-Editors, we thought it was time for a Bulletin makeover. Unfortunately, due to our massive renovations, we got way behind schedule in getting our first issue out. Unlike what we have seen on popular TV shows, renovations and fixer uppers are definitely not completed in 30 minutes! However, we hope that it has been worth the wait and are delighted to present our first issue of the NAN Bulletin.

As you will see, we have substantially revamped the Bulletin, with the goal of making the content up-to-date, informative, relevant, and accessible to an array of audiences including our colleagues, patients, care partners, and anyone interested in brain health.

An additional change that you will see to the Bulletin is the inclusion of multiple voices that span from students to senior colleagues, professionals from other healthcare disciplines, and colleagues across the globe. We are thankful to our colleagues who have contributed excellent pieces on contemporary issues and hot topics in clinical neuropsychology and brain health.

We envision this new Bulletin will provide practical resources that you can share with your patients and their care partners. Also expect to see regular pieces dedicated to topics including student and early career training, inclusion and diversity, and brain teasers and pop quizzes. If you like art, then get ready for some amazing works of art as we are especially excited to feature original brain art in each issue!

We hope you will enjoy this issue of the NAN Bulletin and that you will share it with everyone. As we are still in process of the Bulletin makeover, should you have any feedback and recommendations, definitely let us know.

Sincerely,

Lana and Shawn
Co-Editors, NAN Bulletin

Opinions expressed by the authors and advertisers do not necessarily reflect the position of the National Academy of Neuropsychology.
The Need for Universal Test Score Descriptors in Clinical Neuropsychology

Veronica Bordes-Edgar, Ph.D., ABPP

To the professional neuropsychologist, standard scores convey meaning in performance and functioning based on our knowledge of the tests being administered. However, consumers of our reports often require further explanation through the use of qualitative descriptors. In theory, use of qualitative descriptors also helps to ensure consumers do not misinterpret scores. However, there is much discrepancy both within and outside of neuropsychology as to how to qualitatively label scores. Our results can often impact medical/treatment, academic, and/or legal decisions and therefore, the need for universal test score descriptors has never been greater.

Several psychologists have previously reported on the difficulties and need for clarification on qualitative descriptors (Guilmette, Hagan, & Giuliano, 2008; Schoenberg et al., 2018). The low specificity and limited overlap across providers was highlighted in the 2008 study by Guilmette, et al. Most of their participants reported using qualitative descriptors in reports. While there was greater consistency among participant neuropsychologists at higher standard scores, there was an average of 14 different descriptors across the range of standard scores (50 to 130). Schoenberg et al. (2018) highlighted three different qualitative classifications that are most commonly used, but also lack consistency with each other.

If as psychologists we struggle to communicate the same language, how can we expect referring providers, patients and their families, and other stakeholders to understand our results? Test publishers have attempted labeling structures, but often they are idiosyncratic to individual tests and therefore cannot be universal. Individual organizations such as the National Academy of School Psychology have also attempted to have universal labeling with limited success within neuropsychology. Unfortunately, previous studies/articles have also not been able to garner universal labeling (Heaton, Miller, Taylor & Grant, 2004; Lezak, Howieson & Loring, 2004; Schoenberg et al., 2018).

With previous attempts lacking wide-spread usage, can the field of neuropsychology come together to embrace a universal labeling system? The American Academy of Clinical Neuropsychology (AACN) Consensus Conference met in June 2018 to come to consensus on uniform test score labeling of performance test results. While the consensus report is still pending, it is the hope that it can make significant impact to improve communication of neuropsychological assessment. However, the individual neuropsychologist will need to remain focused on the fact that scores describe a single point in time and it is the combination of scores with behavioral observations and integration of data (including culture, environment and external factors) that define performance and functioning.

Take Home Points

Qualitative descriptors of test results are currently not reliable as they are inconsistent across professionals in our field.

Universal qualitative descriptors are necessary. Previous attempts at creating universal descriptors have been unsuccessful in garnering wide-spread usage.

Recommendations from AACN’s Consensus Conference have the potential to successfully develop universal score descriptors.

References


NAN Distance E-Learning Opportunities

Upcoming Live Webinars:
Convenient 1.5 CE credit presentations addressing current trends in neuropsychology with the opportunity for Q&A with the presenter.

- Sleep & Cognition
- Fetal Alcohol Spectrum Disorders (FASD)
- Pediatric Validity Testing

Recorded Webinars:
Miss one of the live webinars? The webinar recording will be available with the audio and PowerPoint presentation. Complete the short exam for 1.5 CE credits.

- Effective Use of Medical Interpreters in a Neuropsychological Evaluation
- Pragmatic Clinical Ethics in Caring for Patients in the Borderland between Neurology and Psychiatry
- Seeing the Forest for the Trees: Improving Accuracy of Test Interpretation for Clinicians and Researchers
- Review and Update on Adult Performance Validity Testing
- Short- and Long-Term Outcomes After Pediatric Traumatic Brain Injury
- Starting a Civil Forensic Practice: Practical Guidelines and Ethical Considerations
- Frontotemporal Dementia: The Behavioral Phenotype
- Chronic Traumatic Encephalopathy (CTE): What We Think We Know and What We Need to Know Next
- An Update on the Neuropsychology of HIV and Other Infectious Diseases
- Civil Capacities in Neuropsychological Assessment
- Driving and Neuropsychology: New Directions for Improved Assessment and Re-Training
- Orientation to the Legal Profession: A Primer on the Consulting Relationship
- Clinical Trials Research: What's in it for Neuropsychologists?
- Advanced Topics in Assessing Change in the Individual Patient
- Introduction to Assessing Change in the Individual Patient
- Ethical Considerations in Cultural Neuropsychology: What Every Practitioner Needs to Know
- Neuropsychology in Sports-Related Concussion
- Alzheimer’s Disease vs. Alzheimer’s Diseases: Clinical and Pathological Heterogeneity in the Manifestations of Alzheimer’s Disease
- Validity Testing in Assessment of School-Aged Children and Adolescents? You’ve Got to be Kidding!
- Testing Accommodations for People with Disabilities: Research-Based Practice
- The Wada Test in the Age of Functional MRI: Understanding the Basic Principles and Applications of Each Technique in Neurosurgical Patients
- Clinical Considerations for Neuropsychological Evaluation of Patients with Chronic Pain
- The Clinical Utility of Neuropsychological Testing for Patients with Mental Disorders
- Update on Neuropsychological Validity Testing
- Neurological Underpinnings and Neuropsychological Outcomes of Concussion
- Positive Applied Neuropsychology
- Developmental Aspects of Bipolar Disorder in Children, Adolescents and Adults
- Strength-Based Supervision: A Positive Psychology Approach to Clinical Training
- The Effects of Marijuana on Cognition
- How to Conduct a Culturally-Informed Neuropsychology Evaluation with Asian-Americans
- Advanced Legal Practice Issues: Depositions and Testimony for Experts
- Neuropsychological Development and Functioning in Pediatric Neuro-Oncology Survivors: Understanding Risks and Management Techniques
- Being Present: Bringing Mindfulness Practice to Your Personal and Professional Life
- Ethics, Stroke, and Neuropsychology
- Performance Validity Testing in Children: Ethics, Science, and Purpose
Neuropsychological examination typically involves a lengthy process of history taking, interview, observation and evaluation of the patient's behavior, personality, and social interaction, with extensive standardized, psychometric assessment of cognition, emotion and function. The aim of the examination is to identify the strengths and weaknesses of the individual and to identify brain-behavior relationships to formulate a diagnostic impressions and recommendations for intervention as indicated.

The precise approach taken to performing a neuropsychological examination varies around the world, and can be broadly divided into two key approaches: battery-based assessment, and hypothesis-testing assessments. In the battery-based approach, the selection of tests is guided by the referral question and a priori medical record reviews with the aim of constructing an assessment in response to a set of specific questions or hypotheses (e.g., right frontal encephalomalacia on neuroimaging might suggest the administration of D-KEFS Design Fluency). The battery-based approach is common in North America, perhaps reflecting a response to medical litigation. Hence, consistency of methodology in neuropsychological examination reduces potential for litigation claims arising from methodological differences. The hypothesis-testing approach is more common in Australia, the UK and Europe where the lower rate of likelihood for litigation enables a flexible approach to assessment to be utilized. There is, however, much variation in practice in most countries, and the hypothesis-testing based Boston Process Approach developed by Edith Kaplan, originated in North America and enjoys widespread popularity among neuropsychologists (Ashendorf, Swenson, & Libon, 2013).

Irrespective of the approach adopted, comprehensive neuropsychological examination is a lengthy process, with the average assessment taking in excess of 2 hours and typically much longer when all components of the examination are taken into account. In general, battery-based approaches take significantly longer than hypothesis-testing approaches. Due to the length of the comprehensive examination and the costs associated with such assessment, there are increasing attempts to develop brief neuropsychological assessment tools – referred to as a cognitive or mental status screen. A mental status screen typically takes no more than 20-30 minutes, although there is no agreed definition of what constitutes a screening assessment. Typically, screening assessments incorporate a single measure of representative cognitive domains, with a selected subset of cognitive domains (or latent variables) being assessed. However, careful validation of the domains assessed by the single screening measure is rarely available, and studies have shown that the use of a single cognitive screen often ‘miss’ area of cognitive function (e.g., processing speed, figural memory) and results in inflated false negative errors rates, or diagnostic ‘misses’ (Chan et al., 2014; Olson et al., 2011). In contrast, a comprehensive assessment involves multiple measures of each domain with a breadth of domains being examined, usually accompanied by extensive construct-validation (Bonden, 2017), and which maximize sensitivity and specificity rates (see below) vis-à-vis cognitive screening (see Block, Johnson-Greene, Pliskin, & Boake, 2017; Roebuck-Spencer et al., 2017, for reviews).

There is a long history of mental status screening tests, developed for different populations, a review of which is beyond the scope of this piece. However, if we focus on screening tests of cognitive decline in aging populations as an illustrative example, perhaps the best known screening test is the Mini Mental State Examination (MMSE; Folstein, Folstein, & McHugh, 1975), a brief cognitive screen of 11 items (Folstein et al., 1975) for which scores can be adjusted for age and education effects (Crum, Anthony, Bassett, & Folstein, 1993). The MMSE was developed to screen for cognitive impairment in the elderly and seeks to assess basic functions of orientation to time and place, attention, calculation, language, and immediate and delayed memory recall and takes on average 5-10 minutes to complete. Consequently, the MMSE remains a highly popular and widely used brief cognitive screen both in the clinical and non-clinical setting, and it has become a constituent component in other brief diagnostic assessment approaches (e.g., Petersen criteria for Mild Cognitive Impairment (Petersen & Morris, 2005); Preclinical Alzheimer’s Cognitive Composite, or PACC (Donohue et al., 2014)).

Other disease specific mental status screens have been subsequently developed to address concerns regarding the diagnostic specificity of the MMSE. These includes tests such as the Dementia Rating Scale, now in its second edition (DRS-2; Jurica, Leitzen, & Mattis, 2001), the Montreal Cognitive Assessment battery (MoCA; Nasreddine et al., 2005). There has also been an emergence of as computerized assessment batteries such as the
Cambridge Automated Neuropsychological Test Assessment Battery (CANTAB, www.cambridgecognition.com; Barnett, Blackwell, Sahakian, & Robbins, 2016; Robbins et al., 1994; Sahakian & Owen, 1992) and CogSTATE (www.cogstate.com). These computerized assessments cross both brief and comprehensive assessment, with each offering options for brief cognitive status screening, as well as tailored disease specific screening though to multi-domain comprehensive assessment batteries.

Evidence of the diagnostic efficacy of a test is derived from multiple measures of psychometric fidelity, including test reliability (the consistency of a test in measuring a construct) and test validity (evidence that the test is measuring a construct; see Bowden, 2017). Beyond simple psychometric measures of the reliability and validity of the test, there are criteria for evaluating the performance of the test in correctly diagnosing a person with a specific disease. These criteria include: sensitivity (Se) – the probability that a person with the condition of interest will have a positive test result, and specificity (Sp) – the probability that a person without the condition of interest will have a negative test result (Kraemer, 1992; see also Table 1).

If we examine the brief screening tests for conditions such as mild cognitive impairment (MCI) and dementia, then it becomes evident that there are several key classes of test:

1. Tests that lack sensitivity to detect subtle conditions such as MCI, but display adequate sensitivity for the detection of clinical dementia
2. Tests that have acceptable specificity for cognitive impairment, but inadequate sensitivity for the disease or disorder responsible
3. Tests where sensitivity is decreased to detect subtle conditions such as MCI, but suffer from resulting decreased specificity and display unacceptably high false positive detection.
4. Tests that improve sensitivity and specificity with additional measures or items, which extend the time for test administration beyond the realm of “brief” assessment.

A meta-analytic study (Creavin et al., 2016) of the MMSE used in community settings to detect clinically obvious (via DSM, ICD or CRD diagnoses) dementia of any type using a pooled cut point score 24 reported Se = .85 and Sp = .90. With a cut point of 25, rates were Se = .87 and Sp = .82. The authors conclude that the MMSE should not be used alone to confirm or exclude the presence of disease, particularly in low prevalence populations (e.g., community samples; Creavin et al., 2016).
In a similar meta-analysis of the MoCA drawing data from memory clinics, hospital clinics and community samples and using a cut point of 26 for dementia, the MoCA was found to have a Se = .94 with a low Sp = .60 (Davis et al., 2015). Hence, while the MoCA was found to correctly detect 94% of all cases of dementia, it resulted in a false positive diagnosis (1-Sp) of 40% of people without dementia which indicates that the MoCA should also not be used as a stand-alone diagnostic test due to its low specificity. One study examining the capacity of the DRS-2 to differentiate between healthy controls, MCI and AD reported that in using an optimised cut points (total score >136 healthy control; 123-126 MCI; <123 AD), Se = .71 and Sp = .86 was identified for differentiating healthy controls from MCI; Se = .82 and Sp = .78 for differentiating MCI from AD; and Se = .81 and Sp = .86 for differentiating AD/MCI from healthy controls (Springate, Tremont, Papandonatos, & Ott, 2014). Again, as for the MMSE and MoCA, the Se and Sp values attained for the DRS-2 indicate that it lacks accuracy as a stand-alone diagnostic test and provides only an indicator of likely diagnosis requiring further assessment.

In a study assessing the CANTAB Paired Associates Learning (PAL) test capacity to differentiate AD from healthy controls in a memory clinic population, using a cut point of 32 errors on the PAL resulted in Se = .68 and a Sp = 1.0 (O’Connell et al., 2004). Another study found the PAL to display Se = .81 and a Sp = .97 for differentiating early AD from amnestic MCI and healthy controls (Junkkila, Oja, Laine, & Karrasch, 2012). Hence, the CANTAB-PAL displays adequate sensitivity for detecting dementia, but exceptional specificity compared to MMSE, MoCA and DRS-2 indicating a low probability of a false positive detection. Finally, it is important to recognize that the Se and Sp of a test is specific to the population in which it was assessed. Hence, it is erroneous to assume that a test with good Se or Sp for detecting dementia in a screened memory clinic population will display the same levels of Se and Sp when applied to a different population (e.g., community sample) (Kraemer, 1992).

The examination of the data relating to the brief cognitive screens for dementia in aging populations (MMSE, MoCA, DRS-2 CANTAB-PAL) indicate that for most of these tests the Sp levels were too low (.60-.86) indicating a high rate of false positive detection (especially MoCA). The exception to this was the CANTAB-PAL with a Sp of 0.97-1.0. Further, the CANTAB-PAL, MMSE and DRS-2 tests all displayed inadequate Se of .68-.87 indicating a substantial rate of false negative detection of AD. The exception being the MoCA with a Sp of .97 for dementia. Collectively these Se and Sp values highlight that brief screens are only appropriately used to identify those individuals with cognitive deficits that require further assessment for diagnosis.

A further complication for the accuracy of brief cognitive screens in detecting disease is the failure to use adjusted scores for common demographic factors known to influence cognitive performance (e.g. age, education, sec, race/ethnicity, etc). While some tests have added in demographic corrections, there is a lack of uniformity or data regarding the Se and Sp of the adjusted scores in detecting disease states. This lack of demographically adjusted data particularly problematic when assessing for the presence of dementia in low functioning or high functioning groups. In low functioning patients, there is likely to be a significant inflation of false positive detection and in high functioning patients, there is likely to be a significant inflation of false negative detection when unadjusted test scores are used. That said, the expectation of high memory ability in high functioning individual’s rests on a rather faulty assumption that of high associations between memory and intellectual capacity, as prior co-normed tests of such as a the WAIS-3 with the WMS-3 have been shown to display modest associations.

In addition, there is sufficient evidence to indicate that the use of brief cognitive screens in diagnosis of preclinical disease states (e.g., MCI) is inappropriate. As brief cognitive screens display inadequate specificity for differentiating MCI from healthy controls, the use of such measures in diagnosing MCI is likely to lead to excessive false positive detection. This is borne out by multiple studies demonstrating that the use of brief diagnostic tools for MCI result in an excessively high false positive diagnostic rate of 33-56% (Gauthier & Touchon, 2005; Ishikawa & Ikeda, 2007; Larrieu et al., 2002; Palmer, Fratiglioni, & Winblad, 2003). In contrast, comprehensive assessment significantly increases the sensitivity and specificity of MCI diagnosis (Belleville, Fouquet, Hudon, Zomahoun, & Croteau, 2017; Bondi et al., 2014; Bondi & Smith, 2014; Clark et al., 2013; Jak et al., 2009; Klekociuk, Summers, Vickers, & Summers, 2014; Palmer, Bäckman, Winblad, & Fratiglioni, 2008; Summers & Saunders, 2012).

Finally, there are a number of diagnostic strategies, as typified in large scale studies, like the Alzheimer’s Disease Neuroimaging Initiative, that incorporate multiple measures and some cognitive testing to achieve diagnoses of MCI or dementia. Such criteria are usually operationalized as a subjective cognitive complaint, MMSE, subjective/objective cognitive and functional ratings from the Clinical Dementia Rating (Morris, 1993), and education-adjusted delayed recall of Story A of WMS-R Logical Memory (Petersen & Morris, 2005). Such combinations of rating scales and screens like that used in these common MCI criteria have led to misdiagnosis in both directions - false positive (33%) and false negative (7%) errors - relative to gold standard neuropsychological testing. The large false positive error rate, confirmed by their amyloid and tau biomarker negativities and lack of progression relative to other cognitively normal groups, has major negative ramifications for such individuals. Incorrectly diagnosing with MCI - often interpreted to be on the pathway to Alzheimer’s disease - would be expected to have a major pejorative impact on that person’s memory self-efficacy beliefs and perhaps affective status (see Lineweaver, Bondi, Galasko, & Salmon, 2014, for an analogy of disclosing one’s AD susceptibility risk to cognitively normal individuals). Therefore, it is important to emphasize that comprehensive neuropsychological examination remains a far different assessment from both single-instrument cognitive screens and other assemblages of some cognitive and other subjective and ratings together. The latter practice ought not be confused with a formal neuropsychological assessment approach.
Take Home Message

Comprehensive neuropsychological assessment should not be confused with brief cognitive or mental status assessment; these methods are fundamentally different and exist for different reasons.

Comprehensive neuropsychological assessment is necessary for diagnosis, as brief cognitive screens do not result in a diagnosis due to inadequate sensitivity and specificity of these forms of assessment. As such, there should not be a sense of false equivalency between cognitive screens and more comprehensive neuropsychological assessment strategies.

Mental status screening is useful as a method of triage, determining which patients require further comprehensive assessment and which may not. However, not all brief cognitive screens are equal, and with significant variation in false positive and false negative detection rates, there is likely to be a sizeable proportion of people misidentified using a brief screen.

The disease state requiring diagnosis determines whether it is necessary to use a screen with a low false positive or a low false negative detection rate. For progressive neurodegenerative conditions (such as dementia), a low false positive rate is preferable even at the expense of an increased false negative rate as with disease progression over time the probability of correct diagnosis increases. For acute conditions (e.g., delirium, stroke) requiring immediate medical intervention or investigation, it is necessary to use tests with a low false negative rate on the assumption that further examination will reduce any false positive errors.

Mental status screening may be useful for longitudinal monitoring of patients over time where repeat comprehensive assessment may be time- and financially-prohibitive. In these cases, a change over time on a brief cognitive screen can be used as the trigger for a full comprehensive assessment. However, the wide confidence intervals associated with many shorter tests limit their sensitivity to change.

The fundamental problem is not the choice between mental status screen or comprehensive neuropsychological assessment batteries, but the need to understand that these methods have different impacts on clinical decisions and diagnostic error rates. Clinicians should aim to avoid inappropriate use of mental status tests.

References


Applying to and Securing a Clinical Internship as a Neuropsychology Trainee

Brittney Otruba, Ph.D.
Patricia Garcia, Psy.D.

You have spent the last four or more years working towards getting your doctorate, with countless hours of learning clinical neuropsychology (and conscientiously tracked those hours), and you are now close to the finish line with your dissertation. There is one final task left before achieving your degree; the coveted internship placement. For some, this next step of applying, and eventually landing the internship of your dreams, is an exciting adventure filled with travel, good food, and stimulating conversations. However, this process may also be met with a mixture of excitement and uneasiness.

The goal of this article is to help prospective internship applicants combat thoughts, such as “I’m not ready,” or “this may not be my year,” or worse “I will fail miserably” and to instead look towards the light at the end of the tunnel and press on diligently. To do so, we encourage readers to break this daunting process apart into small, more chewable pieces. Below, we provide access to some of the recommendations we received (and systematically followed) during our final training years. These tips extend from the beginning of the application process through the interview itself. Although this is not meant to be an exhaustive list, and is meant as a helpful reference, we hope that this guide will ease and focus your mind as you continue towards your ultimate goal of becoming a neuropsychologist.

The Application Phase (where do I start?):

• You want to give yourself plenty of time so that you are not rushed in the end. Set up a timeline for your applications so that the process feels manageable every step of the way.
• Decide what you want out of a site ahead of time, including your clinical, research, geographic, and fellowship goals in selecting potential internship programs.
• Once you establish some short and long-term objectives for the upcoming year, spend some time looking up sites through the Association of Psychology Postdoctoral and Internship Centers (APPIC) website at www.appic.org. APPIC gives you access to the internship sites and their training brochures, which is information you will need in order to determine how the training offered matches or helps you achieve your established goals.
• Start with a larger number of sites and then whittle down from there based on such considerations as those below.
• Aim for sites that are a good “fit” with your training needs by considering the following:
  ° % of time neuropsychology focused
  ° % of non-neuro training involved
  ° Clinical/research split
  ° Training rotation options
  ° Types of sites (academic medical center, VA, consortium, etc.)
  ° Geographical location
  ° Possibility of a postdoctoral position
• Staying organized is key! Consider creating an internship itinerary with all due dates, documents requested per site, and anything additional such as internship meetings at your school (if applicable).
• Request letters of recommendation from individuals who know you, can speak to your strengths, and are likely to write you a strong letter.
• Do not wait until the last minute to request letters of recommendation. You want to give your letter writers plenty of time to write a thoughtful piece. Our recommendation is to give writers between 4-8 weeks; keep in mind that some letter writers may ask you to draft the letter yourself. It is best to have advance notice of this situation in case it detracts from your time spent on other aspects of the application.
• Tailor your documents to the site and try to identify what they are looking for; you want to sell your skills and what you bring to the table while also emphasizing areas where you strive to grow further.
• Have multiple people read your documents (letters and/or CV) and provide feedback. Encourage such reviewers to be merciless! Now is not the time for kid gloves. However, remember that you do not need to agree with all of their input. In the end, these are your application materials and should reflect you.
• Do not wait until the last minute to submit materials because the APPIC website can be slow and has been known to crash. Aim to have all materials ready for submission at least one week before they are due.

The Preparation Phase (getting all the ducks in a row):

• Write out a schedule ahead of time with possible interview dates to see which may overlap (consider laying it all out on a big physical calendar); consider plotting known interview block from those programs that list their interview dates in advance so that you can attempt to avoid scheduling conflicts as offers start rolling in but you await others.
• When offered an interview, try to select dates that have the least amount of conflicts. Consider reviewing flight, bus, train, and road travel times in advance in order to anticipate scheduling issues.
• Respond to interview offers as soon as possible but try not to stress yourself out by checking your email every five seconds.
The Execution Phase (acing that interview):

- Be on time! Plan on being there 10-15 minutes before the interview starts.
- Bring copies of your CV, work samples, and a list of questions.
- Look over materials again (for the site and what you submitted). Know general information about the rotations that interest you or any points that need clarification.
- Wear comfortable shoes because you will likely be walking around a lot.
- Often times the day/schedule becomes a little hectic and last-minute changes are sometimes unavoidable. For this reason, try to remain flexible and demonstrate your openness and cool-headedness.
- Be ok with not interviewing with the specific people you requested. This does not mean that the site values you any less, it is more likely that scheduling is complex and there are only so many hours in a day (flexibility, remember?). It can go a long way to let interviewers know how impressed you are with how smoothly the day goes, especially in light of how complex it must be to arrange for such a day among so many people.
- Be professional but also be yourself.

- It is ok to be nervous but do not forget to let oxygen circulate in your brain (breathe!).
- People usually want to work with others who want to work with them; so, do not hold back when showing your enthusiasm and interest for a site (though remember to abide by APPIC’s rules).
- Always feel free to ask questions but be sure to allow the interviewer to respond without interrupting him/her.
- Generally, interviewers do a good job of managing their body language and facial expressions, so do not assume you are doing a bad job if you get little feedback from them.
- When a question is unclear or vague, ask for clarification (this is an important clinical skill after all).
- When interviewing with a non-neuropsychologist, be prepared to answer non-neuro questions and show openness to additional experiences (keep in mind that internship is supposed to provide general clinical training experiences as well as specialty training).
• Make notes during your interview process because all of the information that you get at the individual sites will ultimately blend together after two months. Your notes will help you recall what you liked or did not like about the sites; however, it is probably wise to avoid scribbling notes during your actual interviews. Be present when with your interviewers and take time during breaks and at the end of the interview day to jot down your thoughts.
• Follow up with a thank you email. It is generally best to keep these brief and succinct but be sure to mention something specific from your interview(s) so that you add a personal flair.
• Finally, rank-order your sites according to YOUR rankings and not where you think the sites ranked you. The match favors the applicant, and you should go with your goals in mind.

In the end, go into this process with confidence in your training, but most importantly in yourself. Remember that you have made it this far, and that you bring a lot of skills and knowledge that will serve you wherever you end up. Your internship year will help set the stage for your future career, and therefore it is important to tackle this experience with both preparation and excitement. We hope that you have found these recommendations helpful. As a last piece of advice, especially when faced with self-doubt, try to remember some thoughtful words by Winston Churchill who said "success is not final; failure is not fatal. It is the courage to continue that counts." On behalf of the NAN Student and Postdoctoral Resident Committee, we wish you much success in this undertaking.

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Now available - a variety of educational webinars exclusively for trainee members, included within the annual membership fee. In collaboration with leaders in the field, the webinars are specific to the needs and interests of trainees. These webinars can be used to enhance or supplement graduate education, and are available for streaming through the NAN NeuroNetwork online community under member resources.

- So You Want To Be a Research Mentor by Dr. Amy Jak, Ph.D.
- Financial Considerations by Beth Arredondo, Ph.D., ABPP
- Entrepreneurship and Neuropsychology: Essential Information for Starting, Growing & Maintaining a Private Practice by Chriscelyn Tussey, Psy.D., ABPP**
- Succeeding in the Early Career Phase: From Postdoctoral Fellow to Professional by Shawn McClintock, Ph.D., MSCS**
- Neuropsychology Supervision: An Individual Approach to Clinical Training by Mark Jacobson, Ph.D.

**available to postdoctoral fellows only
How to Apply for and Secure a Postdoctoral Fellowship in Clinical Neuropsychology

Victor A. Del Bene, Ph.D.
Miguel Arce Renteria, Ph.D.
Seth A. Margolis, Ph.D.

It is never too early to begin thinking about how to best prepare yourself for applying for post-doctoral fellowship in clinical neuropsychology! Almost as soon as you begin your internship, you will need to begin thinking about postdoctoral fellowship applications. Most applications are due around December. As with internship, there are many professional and personal factors to keep in mind throughout this process. While the application process has similarities with applying to internship, some key differences include: 1) it is less structured (e.g., not all sites accept an extensive application like the Association of Psychology Postdoctoral and Internship Centers (APPIC)), 2) you can participate in the APPIC and/or the Association of Postdoctoral Programs in Clinical Neuropsychology (APPCN) match or not, 3) interviews occur before, during, and after the annual International Neuropsychological Society (INS) meeting and there is not a universal date on which all programs extend offers, and 4) with all of this in mind, the applicant must be more autonomous when searching for and in considering fellowship sites.

We hope that the following information will serve as a useful guide in helping you navigate this process and in securing the best fellowship for you. If you have questions about the application process, please feel free to email the National Academy of Neuropsychology (NAN) Student & Post-Doctoral Resident Committee, or post your questions to NAN’s NeuroNetwork. Similarly, each year at the NAN conference, the Student & Post-Doctoral Resident Committee hosts an Intern, Postdoc, and Early Career conversation hour. Consider attending this event for when you are applying to fellowship positions.

How to maximize your internship year and increase your marketability for fellowships?

• While every fellowship is different, securing an APA or CPA-accredited internship and graduating from an APA or CPA-accredited doctoral program is an important consideration for many training programs.
  ° If your graduate program or internship is not APA- or CPA-accredited, fellowships may still consider your application; however, note that it is in the applicant’s best interest to reach out to programs in advance with this question before spending precious time/energy preparing your application.
  ° Reach out to alumni of your graduate school and internship program to see how they handled securing a fellowship when coming from a non-APA-accredited training program.
• Before applying for fellowship, ensure that your dissertation has been proposed and your data has been collected.
  ° If you can have your data analyzed, or even better if you can defend prior to applying, it will make you a stronger applicant.

• The structure of each internship program is obviously different, but if possible, try to frontload neuropsychology rotations early in the training year. Doing so will permit applicants to speak to these training experiences in cover letters and on interviews. Additionally, neuropsychology supervisors who will be writing letters of recommendation for you will have had ample opportunity to learn how terrific you are!
• Share your list of fellowship sites with colleagues, academic advisors, and clinical supervisors. They might know people at the sites where you are applying and be able to reach out and put in a good word for you.

What type of fellowship is right for me?

• First determine the type of fellowship you want.
  ° Consider the population
    - Adult, geriatric, pediatric, lifespan
    - Inpatient, outpatient, mixed
    - Neurology, psychiatry, rehabilitation, neurosurgery
  ° Consider the institution
    - Academic medical center
    - VA medical center
    - Rehabilitation hospital
    - Community clinic
    - Private practice
  ° Consider the distribution of clinical and research time
    - Most programs will either be weighted more towards clinical work or research activities; few offer a 50/50 split.
    - Be honest with yourself – do you want more of a research or clinical career?
    - Apply to programs that will set you up for the kind of work you will actually be doing after fellowship.
    - Consider whether or not you hope to submit for grants during fellowship in order to jump start your academic career; if this is the case, consider how much mentored research/grantsmanship training programs offer.
- Also consider whether your research time is “protected.” This will be especially important for those individuals who have academic aspirations.  
- Do you desire training in neuroimaging or advanced statistical methodologies?  
* Consider the kinds of clinical experiences you most want to have  
  - What clinical populations are you most interested in (i.e., Alzheimer’s disease and related dementias, TBI, epilepsy, neurodevelopmental disorders, immunocompromised populations, psychiatric illnesses, complex medical scenarios)?  
  - Any clinical skills you want to develop (e.g., Wada testing, presurgical assessment, cognitive rehabilitation, medicolegal work, etc.).  
  - Be sure to seek out clinical activities that will help you deepen existing areas of expertise for you, as well as areas where you have yet to develop (but still desire) training. This may be one of the last opportunities to get these supervised experiences!  
* It is all about the fit!  
  - Look for programs that have overlap with your training to date, but recognize that the overlap should not be 100%. You will want to show that you have room to grow as a clinician and researcher.

**Identifying Fellowships**

- Consider your career goals: if you aspire to board certification in clinical neuropsychology, educate yourself about the requirements for this process  
  - America Board of Clinical Neuropsychology (ABCN)  
  - The American Board of Professional Neuropsychology (ABN)  
  - American Academy of Pediatric Neuropsychology (AAPdN)  
- Join the multiple neuropsychology listservs where fellowship and job positions are frequently posted (e.g., npsych and AACN community listservs).  
- Look on message boards for available positions at conferences.  
- Make use of the NAN NeuroNetwork and attend conferences, such as NAN, to begin networking early.  
- The Society for Clinical Neuropsychology website (https://training.scn40.org/) has a directory of clinical neuropsychology fellowships that meet Houston Conference Guidelines. Many programs update this information in a rolling fashion all the way through the INS meeting where many interviews occur.  
- APPCN match programs are listed on the APPCN website.  
- Check in with mentors so that they can let you know about sites that you might be missing!  
- Considering your internship. Several internship programs may offer a neuropsychology fellowship that fits your needs and many such programs recruit from their intern class. If this is a possibility and of interest to you, consider this option early on in your internship year. Discuss with your supervisors.

**Applying**

- Unlike internship applications, there is no standard process for fellowships.  
- There is a portal for programs in the APPCN match, but most fellowships prefer to have materials emailed to them.  
- Most fellowships will post announcements between September and December. It is during this time that you want to check your listserv emails regularly!  
- Most training programs will require materials be submitted between December and January 15th, but there is some variability and some programs may have later or earlier due dates.  
- Keep a detailed file with the names of the programs, training directors, contact information, a list of required materials, and due dates for tracking purposes.  
  - Identify training gaps that cannot be filled on internship and use them as selling points.  
  - For example, you may have experience in several areas offered by a fellowship, except for epilepsy. Convey this interest in your cover letter and during the interview!  
  - Use this training gap to explain why this particular fellowship is critical in your development as a neuropsychologist-in-training.  
  - However, do not over emphasize the training gaps, as you want to play up the training you have had and will be bringing in to the experience; fellows are generally viewed as junior colleagues and so it will be important to demonstrate the competencies that you are entering your training with already.  
* Consider where you want to live and practice.  
  - If you are geographically limited, understand that you may have limited options. Some geographic regions have fewer fellowships than others.  
  - Though you have been working toward this goal for what seems like a lifetime, one’s training years are an invaluable yet relatively short timeframe in the big scheme of things. Speak with your significant other and family early on about this process and consider whether or not relocating is a possibility.

* Share this list with those supervisors writing letter of recommendation.  
  - Remember to ask your supervisors for letters of recommendations early in the year! You want to give them at least a month to draft a letter.  
  - Have trusted friends and mentors/supervisors review your CV and cover letters for typos and content. Encourage them to edit these mercilessly!  
  - Consider the pros and cons of match vs. independent (i.e., non-match) sites (see below).
There are terrific programs that participate in a match system and other terrific programs that operate independent of such systems; we suggest applying to both.

Decide where you apply based on your fit and interest in a program and the training gaps they can fill, rather than if they are part of a match system or not.

If you receive an offer from a program that operates outside a match system before the APPCN match day, you can inquire about your status with the programs in the match with whom you already interviewed. More information on rules and policies of the match may be found at https://natmatch.com/appcnmat/rules.html.

For example, an independent program offers you a position before or during INS and you already interviewed with one or more match programs that you prefer. You can reach out to your top choice within the match to inquire about your standing. The training program is allowed to inform you of your standing and you can use this information to determine whether to accept or decline the other offer.

Match or Independent (i.e., Non-Match) Programs

Most interviews will be held at the annual INS meeting in February.

If possible, try scheduling interviews before INS. If you do so:
- Scheduling interviews at INS will be easier.
- INS will be less stressful and you can focus more on each interview.
- If you receive an offer before or during INS and you prefer a position within the match, you can reach out to programs in the match that you interviewed with and inquire about your status.

By this point you should be experts at interviewing, but make sure to:
- Be well-rested
- Dress your best
- Bring updated CVs to your interview
- Ask questions about things that cannot be found in the program materials or on the website
- Be ready to give a short overview of your dissertation and other research
- Be ready to answer why their program is a great fit with your experience and to speak to your short and long-term goals
- Ask to speak with current or past fellows
- Ask about outcomes: where do fellows usually take jobs, what is the board certification success rate post-fellowship, what percentage of fellows obtain grant funding post-training
- Treat every interaction as an interview, even if you are told it is “informal”
- Be confident and speak to your accomplishments, but show humility

Interviewing

Victor A. Del Bene, Ph.D. is a clinical neuropsychology postdoctoral fellow at Johns Hopkins University School of Medicine in the Department of Psychiatry & Behavioral Sciences, Division of Medical Psychology. He is the chair of the NAN Student & Post-Doctoral Resident Committee.

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Seth A. Margolis, Ph.D. is a clinical neuropsychologist in the Neuropsychology Program at The Miriam Hospital and Rhode Island Hospital and a Clinical Instructor in the Department of Psychiatry and Human Behavior at the Alpert Medical School of Brown University. He completed his clinical neuropsychology postdoctoral fellowship at Brown University. He is a former chair of the NAN Student and Post-Doctoral Resident Committee.
It is said that brain games might help boost cognitive functioning. As such, feel free to take this pop quiz and see if you can correctly answer some questions regarding the National Academy of Neuropsychology (NAN). To find all answers, go to the NAN website: https://nanonline.org

**Question 1. Who was the first President of NAN?**

a. W. Lynn Smith, PhD  
b. Arthur Canter, PhD  
c. Erin D. Bigler, PhD  
d. Sandra Koffler, PhD

**Question 2. Name the first book published in the NAN Book Series.**

a. Secondary Influences on Neuropsychological Test Performance  
b. Civil Capacities in Clinical Neuropsychology: Research Findings and Practical Applications  
c. Neuropsychological Assessment in the Age of Evidence-Based Practice: Diagnostic and Treatment Evaluation  
d. Neuropsychological Aspects of Substance Use Disorders: Evidenced-Based Perspectives

**Question 3. What is the name of the recently created NAN online community?**

a. NeuroNetwork  
b. BrainNetwork  
c. NeuralNetwork  
d. The Neuro Circuit

**Question 4. The mission of this NAN Committee is to educate, encourage, and mentor female neuropsychologists to become leaders within NAN and in the field.**

a. Membership Committee  
b. Education Committee  
c. Women in Leadership (WIL) Committee  
d. Culture and Diversity Committee
What is a Concussion?
A concussion is a mild traumatic brain injury (mTBI) defined as a disruption in the function of the brain due to a biomechanical force (Menon et al., 2010). It is largely differentiated from more moderate or severe TBI’s by loss of consciousness less than 30 minutes, post-traumatic amnesia lasting less than one day, and a Glasgow Coma Scale (GCS) score greater than 12. While this commonly includes a direct injury to the head by an external force, it can also stem from a sudden rotation or force exerted on the head and/or body, such as whiplash. A concussion can cause a range of pathophysiological changes in the brain, including a disruption in blood flow, change in glucose (blood sugar), neurotransmitter dysregulation (chemicals released by brain nerves), and neuroinflammation (Giza and Hovda, 2001).

Mechanism of Injury
The most common cause for mTBI is falls, which disproportionately affect the youngest and oldest age groups. The most common causes among children are non-accidental trauma in infants, falls in toddlers, pedestrian versus motor vehicle accidents (MVA) in school-age children, and MVA in adolescents 16 years and older (Tayler, Bell, & Breiding, 2017). According to the Centers for Disease Control (CDC), it is estimated that the overall reported incidence of sports-related concussion (SRC) and recreational activity in the United States is between 1.6 to 3.8 million a year (CDC, 2018). Of those, approximately 10% represent SRC and the incidence rate is on the rise (CDC, 2018). The rate for SRC has increased steadily – largely due to an increase in public awareness (Taylor et al, 2017) and better surveillance by coaches and trainers (Buckley, Burdette, & Kelly, 2015).

Signs and Symptoms of Concussion
Signs of a concussion are observable indications of an injury and may include disorientation, incoherent speech, vacant stare, confusion, or loss of consciousness. Signs requiring immediate attention and hospitalization include loss of consciousness, seizure, vomiting, severe headache, pupillary asymmetry, or painful cervical range of motion. Symptoms of a concussion are self-reported indicators of an injury and are often categorized into physical, emotional, or cognitive symptoms, which typically resolve within a few weeks (Crowe et al., 2016). Common physical symptoms may include blurry and/or double vision, headache, sensitivity to light or sound, ringing in the ears, dizziness, nausea, and poor balance. Cognitive symptoms may include fogginess, difficulty concentrating, forgetfulness, and slowness to respond. Emotional symptoms may include feeling irritable, frustrated, sad, emotionally labile, or nervous. More recently, sleep disturbances have been proposed as a fourth category of post concussive symptoms that can also be a result of physiological brain changes or reciprocal interaction between cognitive, emotional, and physical symptoms. In general, post-concussive symptoms may impact school or work performance, self-regulation, social interaction, and everyday adaptive functioning (CDC, 2018; Treble-Barna et al., 2017).

Sports Related Concussion Evaluation
As with any type of injury, symptoms and the events preceding and following the injury are assessed after a suspected SRC. Screening tools like the SCAT5 (Sideline Concussion Assessment Tool-5th edition) or ACE (Acute Concussion Evaluation) may also be administered immediately after the injury to assess symptoms. The SCAT5 is a sideline assessment for an acute injury and includes orientation questions related to the current game, Glasgow Coma Scale, a cervical spinal screen, symptom checklist, neurologic screen, a balance test, and a cognitive screen.

During the recovery period, a range of health care providers may repeatedly assess post-concussion symptoms using neurological examinations, balance tests, and cognitive measures including standard neuropsychological tests or computerized tests like the ImPACT (Immediate Post-Concussion Assessment and Cognitive Testing). ImPACT is often used with student athletes to compare baseline to post-injury functioning (Covassin et al., 2009). While these types of evaluations make use of randomized stimuli to reduce practice effects and make efforts to consider pre-injury differences (ADHD, learning problems, culture/linguistics, psychiatric history), computerized tests can be less sensitive in assessing post-injury cognitive changes than evaluations completed by a neuropsychologist (Meyer & Arnett, 2015). More thorough evaluations by concussion specialists are often needed for athletes who continue to exhibit symptoms beyond the typical 1-4-week recovery period.
**Prolonged Recovery/Persistent Symptoms**

The most common symptoms that may continue to linger after a concussion include headaches and emotional symptoms. Preexisting history of headaches/migraines are predictors for prolonged recovery following a SRC (Davis et al., 2007). Research also indicates that preexisting conditions such as ADHD, learning disorders, or mental health diagnoses may also influence the recovery period (CDCC, 2018). Continued evaluation of an athlete with persistent symptoms is vital during the recovery process and may include symptom checklists, neurological exams, vestibular assessment, and balance testing. A comprehensive neuropsychological evaluation may be administered to athletes with cognitive and emotional symptoms to assess attention, executive function, memory, processing speed, and/or emotional difficulties. During the evaluation period, health care professionals also provide concussion education as it relates to the physical, cognitive, and emotional triad, which is vital during the recovery period.

**Intervention**

The optimal treatment approach is a multimodal intervention that targets four key domains simultaneously – the individual, family, school or work, and athletics/activities (Kirkwood et al., 2008). At both the individual and the family level, psychoeducation on symptom treatment and recovery is key. Education may also be provided at the school for student athletes, as the school system will also have mandated protocols for a gradual return to activity/athletics. Employers may need to be informed of any accommodations that may be needed for individuals returning to work.

As the individual makes the graduated return back to school, work, and daily activities, increased awareness is placed on their emotional adjustment as well as repeat injury prevention. Commonly, accommodations can be provided to assist with the graduated return, with the understanding that accommodations will slowly be removed as symptoms improve. For school and work, this can include breaks for concentration difficulties and/or headaches, extra time for makeup work, dimmed lights on electronic devices or complete assignments without such devices, and avoidance of loud atmospheres like the lunch or break room. For return to physical activity, this may include initial rest, but returning to light aerobic exercise as soon as possible. If there is no increase in symptoms during light aerobic exercise, more intense exercise may be attempted and gradually increased as long as symptoms do not persist. The key is continue with as much activity that does not increase or intensify symptoms – all of which can occur with the written authorization of a medical professional.

Targeted interventions for specific symptom relief may include medication management for headaches, sleep, and/or mood in isolation or in combination with other therapies including vestibular and behavioral modifications.

**What is CTE?**

Recent media coverage on contact sports in professional athletes has highlighted the potential long-term consequences of concussions and/or repeated hits to the head. Abnormal findings following autopsy of some athletes’ brains have been labeled chronic traumatic encephalopathy (CTE), which is characterized by abnormal tau protein deposits in the brain. CTE can only be diagnosed by an autopsy of the brain and cannot be diagnosed in a living person. It is important to note that abnormal tau proteins in the brain are also found in people with neurological disorders and are not unique to CTE. Research on CTE has primarily focused on the brains of deceased professional athletes with retrospective examination of behavioral symptoms and limited information on other potential contributing factors such as substance abuse or history of mental illness. There is also no current research to link youth contact sport participation with a risk for CTE and current prevalence rates are unknown at this time. For more information on CTE, please visit the Sports Neuropsychology Society’s CTE Fact Sheet.

**Other Resources**

More comprehensive and up-to-date information on mTBI, including sports-related mTBI can be found in the Report to Congress: The Management of Traumatic Brain Injury in Children, National Center for Injury Prevention and Control (2018), CDC Heads Up program, and the Berlin Consensus Statement (2017).

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**Important Note**

Concussions can occur during any sport at any level and it is important to monitor potential signs and symptoms of a concussion. Every state now has concussion laws that mandate proper evaluation and return to play guidelines for a suspected concussion in student athletes. Please visit your individual state laws for your specific guidelines. Overall, sports provide athletes with healthy exercise habits and life lessons of teamwork, confidence, and respect with minimal risk for injury. So, play it safe!
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