

## Editorial

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# The science and practice of neuropsychological assessment in neurorehabilitation: An introduction to the special issue

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Neuropsychological assessment is an integral component of rehabilitation for individuals with a history of neurological illness or injury. The articles included in this special issue of *NeuroRehabilitation* demonstrate the wide-ranging value that neuropsychological assessment contributes to the science and practice of neurorehabilitation. The researchers and clinicians who authored these works are international leaders in the areas of performance validity and effort testing, the expanding role of neuroimaging in neurorehabilitation, and the clinical and therapeutic applications of neuropsychological assessment.

The first two articles of the special issue address the essential topic of performance validity testing (PVT), which the National Academy of Neuropsychology and the American Academy of Clinical Neuropsychology identify as a standard of practice in neuropsychological evaluation. These guidelines follow decades of PVT research that consistently show prevalence of PVT failure in compensation-seeking and forensic populations in the rehabilitation setting. Refining questions about the operational

characteristics of PVTs in diverse demographic and non-forensic populations, as well as clinical decision making about PVT score profiles remain areas of need. Robert Kanser and colleagues address PVT by reviewing participant PVT performance administered over the telephone within the Veterans Affairs Traumatic Brain Injury (TBI) Model Systems program. The findings illustrate the use of PVTs in the telehealth setting, with particular applicability to the COVID-19 pandemic during which teleneuropsychology has rapidly evolved. This study lends validity to telephone-based PVT screening, an important finding for future use of teleneuropsychology in rehabilitation care. Lazlo Erdodi presents the use of multivariate PVT models to enhance the understanding and overall utility of determining performance validity throughout the neuropsychology evaluation. Moreover, he makes a compelling argument for researchers and practitioners to view PVT performance on a continuum, rather than a dichotomous pass/fail outcome. The editors view this perspective as an important step toward a more nuanced interpretation of an individual's performance across tests.

Two articles in this special issue represent advanced efforts to enhance understanding of performance and patterns of neurocognitive functioning

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through neuropsychological assessment. Silvana Costa and colleagues present their work regarding performance on an adapted Symbol Digit Modalities Test based on whether the response modality is written or oral. Their work demonstrates that although *accuracy* was not affected by the adapted response modalities for the SDMT, performance *efficiency* among those who provided written responses was significantly affected. These findings will inform ongoing efforts to address limitations of the SDMT, a test that is a core component of neuropsychological assessment among individuals with a history of neurological illness or injury. Umesh Venkatesan and colleagues describe a unique association between the duration of posttraumatic amnesia (PTA) and impaired memory functioning among individuals with a history of moderate-to-severe TBI. After controlling for functioning in the domains of processing speed and executive functioning, they found a persistent association between the duration of PTA and delayed verbal recall in the chronic phase of recovery from TBI. Their findings offer new insights into both (a) the injury distribution and neurocognitive performance patterns associated with PTA during the acute phase of recovery and (b) the predictive power that duration of PTA holds to guide the selection of cognitive rehabilitation targets in the chronic phase of recovery from moderate-to-severe TBI.

Neuropsychology defines itself as a field that integrates information from various health and behavioral sciences to produce a refined and comprehensive clinical picture informing cognitive performance, diagnostic probabilities, and rehabilitation interventions. Several articles in this special issue explore one such area – the nexus of neuropsychology and neuroimaging. Erin Bigler and Steven Allder's article proposes using quantitative radiographic technology to further inform neurorehabilitation by interpreting abnormal imaging findings in the context of the cerebral networks in which they are found, rather than within a particular localized brain area. The authors purport that quantitative neuroimaging techniques can provide important information regarding functional network impact, subsequently guiding the rehabilitation process. Their approach raises the need to further investigate whether this type of technology generalizes to the functional level, which remains one of the more elusive aspects of the radiological sciences. To help illustrate the functional correlates of abnormal neuroimaging findings, George Prigatano and colleagues provide a clinical commentary on the concept of plasticity from a neurorehabilitation

perspective, elucidating historical contributions of the concept and utilizing a case demonstration that illustrates the impact of specific neurorehabilitation programming on neuroimaging changes, even in the chronic stage. Their commentary elucidates the concept of diaschisis and the need to further uncover the role of network interruption as a form of plasticity, whereby imaging-informed rehabilitation can target specific intact cerebral networks in lieu of injury effected ones, possibly reducing the impact of diaschisis.

Although neuropsychological assessment is historically conducted for purposes of diagnosis, the special issue concludes with four articles that demonstrate the therapeutic value of integrating neuropsychological assessment into the rehabilitation treatment process. Gerald Voelbel and colleagues utilized a battery of commonly administered neuropsychological measures to assess the effect of a computerized cognitive training system for remediation of auditory information processing post-TBI. This study illustrates the utility of neuropsychological measures in evaluating novel rehabilitation interventions, particularly for computer-based interventions that have seen a marked increase in use during the COVID-19 pandemic. Robert Perna and colleagues describe the role of neuropsychological assessment and intervention in a return-to-driving program for individuals with a history of brain injury, which is a meaningful rehabilitation goal for many individuals. They provide a detailed review of screening processes, treatment planning, and the role of the neuropsychologist in the team milieu. Brigid Waldron-Perrine and colleagues propose a formal, evidence-informed approach to integrating psychotherapeutic techniques into neuropsychological assessment throughout the rehabilitation process. Within a framework of Collaborative Therapeutic Neuropsychological Assessment, these authors demonstrate how therapeutic approaches such as Motivational Interviewing and Acceptance and Commitment Therapy can enhance the process of giving difficult feedback, responding to resistance, addressing impaired self-awareness, and promoting behavioral health change. Finally, Mark Pedrotty and colleagues introduce a model of Integrative Cognitive Rehabilitation Psychotherapy. Their model provides a framework to apply empirically supported therapeutic interventions across a range of theoretical orientations and within a biopsychosocial approach inclusive of cognitive, spiritual, and cultural factors.

Taken together, the articles in this special issue demonstrate the breadth and depth that clinical neuropsychology contributes to the neurorehabilitation process. While some topics represent nuanced examination of perennial discussions, such as the use of performance validity testing, other topics offer explorations of emerging science, such as the application of quantitative radiographic technology to neurorehabilitation. The special issue closes with a thoughtful examination of approaches to compre-

hensive neuropsychological interventions that honor the individual differences and complexity of challenges often encountered in the neurorehabilitation process. Finally, beyond clarifying the state of science and practice in neurorehabilitation, the authors also set forth a meaningful agenda for future research necessary to expand and evolve the field of clinical neuropsychology.