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The neuropsychology of borderline personality disorder: A meta-analysis and review

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Abstract

The neuropsychological profile of borderline personality disorder (BPD) is unclear. Past investigations have produced seemingly inconsistent results concerning precisely what neuropsychological deficits characterize the patient with BPD. A meta-analysis of 10 studies was conducted comparing BPD and healthy comparison groups on selected neuropsychological measures comprising six domains of functioning: attention, cognitive flexibility, learning and memory, planning, speeded processing, and visuospatial abilities. BPD participants performed more poorly than controls across all neuropsychological domains, with mean effect sizes (Cohen's *d*) ranging from −0.29 for cognitive flexibility to −1.43 for planning. The results suggest that persons with BPD perform more poorly than healthy comparison groups in multiple neurocognitive domains and that these deficits may be more strongly lateralized to the right hemisphere. Although neuropsychological testing appears to be sensitive to the neurocognitive deficits of BPD, the clinical utility of these results is limited. Implications of these findings for future neurocognitive investigations of BPD are discussed.
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1. Introduction

Borderline personality disorder (BPD) is a disorder characterized by affective instability, impulsivity, cognitive disruptions, and interpersonal difficulties (American Psychiatric Association, 2000), and it affects approximately 2% of the population (Swartz et al., 1990). The literature on BPD abounds with reports of memory (Korfine and Hooley, 2000; Startup et al., 2001) and perceptual distortions (George and Soloff, 1986; Sundbom et al., 1989; Yee et al., 2005), symptoms suggesting a potential underlying brain pathology in this often chronic psychiatric disorder. However, a clear characterization of the neurocognitive features of BPD has proved elusive.

While initial neurobehavioral studies of BPD appeared to demonstrate a link between acquired or developmental brain dysfunction and borderline psy-

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chopathology (Andrulonis et al., 1989; van Reekum, 1993; van Reekum et al., 1996), these early neuropsychological investigations failed to present a consistent pattern of neurocognitive disruption. For instance, a study by Cornelius et al. (1989) was unable to detect differences between BPD patients and a healthy control group selected from historical records in the domains of memory, language, motor, and spatial functioning.

O'Leary et al. (1991) were among the first to use a more methodologically sound approach to examine the neurocognition of BPD, revealing distinct impairments in BPD participants relative to controls primarily in tasks assessing memory, as well as the processes of visual discrimination and filtering. These results were largely supported by studies carried out by Judd and Ruff (1993) and Swirsky-Sacchetti et al. (1993). Although the latter investigation failed to replicate a decrement in performance for the BPD group on the digit-symbol test of the Wechsler Adult Intelligence Scale-Revised (WAIS-R, Wechsler, 1981), it was the only study to find a difference between groups in the interference condition of the Stroop Color and Word Test (Golden, 1978). In addition, using a short 11-item neurocognitive screening examination, Burgess (1990) demonstrated significant differences between groups on measures of memory and rhythm reproduction.

Many of the more recent neuropsychological investigations of BPD used more comprehensive neuropsychological batteries than used in earlier studies and seemed to identify specific neurocognitive impairments among BPD participants. Dinn et al. (2004) compared BPD and healthy control groups in a number of cognitive domains, particularly tasks assessing multiple facets of attention. BPD patients were impaired on tests of visuospatial abilities, speeded processing, and nonverbal memory skills, yet there were no striking differences observed on tests of attention, verbal memory, and alternation learning. Additional neurocognitive impairments associated with BPD were demonstrated by Bazanis et al. (2002), in which BPD participants performed more poorly on tasks assessing planning and decision-making but no differently in tests of visual recognition memory, including pattern and spatial recognition. Further, Posner et al. (2002) identified a specific deficiency in an attentional network involved in conflict resolution and cognitive control, which was distinct from systems involved in emotion regulation.

Despite the abundance of evidence in support of neurocognitive deficits in BPD, many investigations have failed to identify any remarkable differences between BPD and healthy control groups. Kunert et al. (2003) conducted extensive neuropsychological testing of BPD and healthy control participants, including assessments of intelligence, attention, visual scanning, cognitive flexibility, working memory, planning and problem solving, and learning and memory. Although BPD participants demonstrated higher scores on self-report measures of aggressiveness and impulsiveness, the patient group only performed more poorly than controls in the reading condition of the Stroop test and made more errors in the interference condition. Similarly, Sprock et al. (2000) observed no differences between groups on any of the neuropsychological measures they employed with the exception of one non-interference condition of the Stroop test in which BPD participants took significantly longer than the healthy control group to name color-congruent words. Theunissen and Walker (2003) also found no differences between BPD and depressed controls on measures of working memory, speeded processing, cognitive flexibility, planning, and visuospatial abilities.

Evidently the relationship between neurocognition and borderline psychopathology is unclear. The purpose of the present meta-analysis is to provide a unified examination of the current literature in to explicate the specific neuropsychological domains of functioning that may be impaired in persons with BPD. Interpreting individual investigations of BPD is complicated by the varied way in which BPD has been operationally defined, whether it be self-report, semi-structured interviews, or unstructured interviews. Studies have also differed widely in the specific neuropsychological measures used to assess the functional integrity of neural systems. These two sources of variability have contributed to an unclear understanding of the potential brain pathology that may underlie BPD, and it is expected that an amalgamation of these individual findings will generate a coherent characterization of the neurocognitive features of BPD.

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