

Issues of Diversity in Clinical Neuropsychology

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Editor

The Neuropsychology of Women

 Springer

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Preface

This book, *The Neuropsychology of Women*, is about brain-behavior relationships across the female life span. Historically, sex differences in research were either ignored or prohibited due to concerns about negative impact on reproductive health. A movement at the Federal level to include women in research studies and outcomes has emerged over the past 20 years. It now appears that there is just enough research about sex and gender differences in the neurosciences and health sciences to suggest that not only should these differences be included in all analyses but also there are enough major differences to produce the need for a specific set of competencies for health care practitioners working with female clients. To that end, the chapters in this volume are designed to provide the reader with a synopsis of neuropsychological perspectives on brain development, brain imaging, brain injury, chronic illness, epilepsy, dyslexia, aging and eating disorders with the female client in mind. It intended to be a helpful resource for anyone who works in the field of neuropsychology and related fields who wishes to increase his or her knowledge and competencies in working with women.

If we write about women we must write about the stages of their lives, usually tied to reproduction options and changes, and characterized by a dynamic brain-behavior burden. The word burden is used here not to depict a heavy and obstructive load - but more as an important variable that demands consideration because it affects all aspects of female functioning. The burden unfolds from birth without conscious intent on the part of the woman and it rests with the severance of reproductive ability and a completely different hormonal makeup that guards against some forms of dementia and nudges the woman towards other forms of dementia later in life. Hence, neuroscientific research literature now tends to be more specific in terms of relating genotype to phenotype and sex versus gender differences in development, etiology, course, and quality of life.

There are 10 chapters in this small handbook that represent multiple aspects of research and practice with female clients.

Phylis Anne Teeter-Ellison and Amy Nelson explore current research on brain development, including new findings on gender differences. They have found that males and females appear to have meaningful differences in brain maturation that create interesting applications for the way in which we educate and nurture our youth. In this chapter, they provide a brief overview of neurodevelopment and

highlighted major gender differences in brain development. Gender differences in gray matter development have been found, specifically in maximum cortical gray matter thickness in total brain volume, frontal lobe, parietal lobe, and caudate nucleus. Regional differences were not found to be as pronounced in temporal gray matter development. Peak growth curves were also found in the basal ganglia, where female brains reach peak volume almost three years earlier than males. The extent to which gender differences in brain development can be linked to cognitive and behavioral differences is still under study. The authors suggest that future studies will no doubt explore this linkage with better neuroimaging technologies and measures of neuropsychological functioning. They also state that this avenue of neuroscience holds promise for educational practices, early interventions and comprehensive treatment programs for children with biogenetic and acquired brain related disorders.

In the chapter on neuroimaging, Drs. Margaret Semrud-Clikeman, Jodene Goldenring Fine, and Jesse Bledsoe present the various types of imaging techniques (MRI, fMRI, PET, SPECT and DTI) as well as a comprehensive review of literature on gender differences found with neuroimaging. Findings on gender differences in normal development, pediatric through geriatric are reviewed with attention to gray matter, white matter, hormonal influences, and specific brain regions in each of the developmental sections. Adult mental health, aging, and neurodegenerative issues are represented by a review of one condition for each: schizophrenia, Alzheimer's and Multiple Sclerosis. Being a nascent methodology, the state of neuroimaging research is of variable quality and somewhat neglectful of women's issues in general. The authors offer advice on how to recognize research of quality and suggest that more effort be focused on establishing research lines that include women in particular, especially for those issues that are salient to women's health.

Regarding brain injury, Drs. Elaine Clark and Janiece Pompa find that females are not as well represented as males in the scientific literature regarding brain injury. What scant research that does exist, is mixed. They conclude that whereas some studies have found a clear advantage for females compared to males in terms of functional outcomes, others have found that women do much worse, even when similar outcome variables are assessed (such as these studies investigating vocational outcomes). The authors relate that in the late 1990s, the National Institutes of Health (NIH) convened a panel to evaluate the existing traumatic brain injury (TBI) research. The panel concluded from their review that the research sum at that time was inadequate to address the issue of recovery, especially with regard to long-term outcomes. The panel recommended that more investigations be conducted with females who sustain brain injuries. Since 1999, there has been an increase in systematic research studying the effects of TBI's on sex differences, including sex differences in brain anatomy and physiology that might account for differences in post-injury outcomes in males and females. Dr. Clark and Dr. Pompa introduce a new area of brain injury recovery that has opened up with the increase of women in the military returning from combat areas with blast related injuries. They propose that the need for information on sex and gender differences in brain injury treatment and recovery has never before been more pressing.

In the chapter entitled, *The Neuropsychology of Attention-Deficit/Hyperactivity Disorder in Females*, Dr. Nancy Nussbaum presents research pertaining to gender differences in presentation of symptoms, neurobiology and biological factors, and on neuropsychological measures of ADHD. This chapter is an excellent and provocative exploration of current research on gender differences that promote improved quality of psychological care provided to girls and women and to highlight future areas of research on this disorder.

In their second chapter, Amy Nelson and Phyllis Anne Teeter-Ellison review the evidence for gender differences in dyslexia. Their findings are mixed with both similarities and differences across genders. The genetic basis of the disorder and the same cortical substrates - temporo-parieto-occipital brain regions - are involved in the reading process for both males and females. On average, females have larger cortical areas in regions underlying language, and women have greater bi-hemispheric representation for some language skills compared to males. Females may have some advantages that protect against early insult or neurodevelopmental anomalies affecting these brain regions. The authors suggest that the extent to which genetic and anatomical differences are protective needs further investigation. Specifically, differences in early literacy environment and instruction may ultimately affect the development of neural networks involved with reading accounting for gender differences. There are a number of important environmental factors that explain individual differences in reading skills, including: socioeconomic status of the child's family, school and community; teachers and their pedagogical approach; and, availability of materials to enhance early learning and literacy. Dr. Teeter-Ellison concludes that while these pre-literacy experiences predict reading abilities in grade 3, to date, there is nothing to suggest that males or females may be different in these early home experiences.

LeAdelle Phelps has provided an insightful chapter to this volume entitled *Critical Issues in Chronic Illnesses of Women*. She reviews two disorders that affect far more females than males: fibromyalgia and multiple sclerosis. The biological bases for such differences are likely related to the sex hormones as fibromyalgia has a female-to-male incidence ratio of 9:1, which is likely related to the effect of estrogen on the hypothalamic-pituitary-adrenal axis (HPAA) and autonomic nervous system (ANS). By comparison, multiple sclerosis has a female-to-male ratio of 3:1. Although it has been estimated that genetics account for 20-50% of the disease probability, large prospective studies have documented a significant reduction in disease activity during pregnancy. Interestingly, Dr. Phelps suggests that it is important that we identify possible protective variables, even if temporary such as pregnancy in women with MS, that is affiliated with improved resistance and resilience. She also suggests that treatment programs could be developed that includes highly specific strategies with the prevailing intent to reduce risk factors while enhancing protective factors.

Dr. Catherine Cook-Cottone provides an in-depth review of the neuropsychological aspects of eating disorders. Eating disorder prevalence rates have the highest female to male ratio of any psychiatric disorder and there have been fewer neuropsychological studies of eating disorders than of any of the other major psychiatric

disorders. Dr. Cook-Cottone summarizes research results of neuropsychological assessments that have been used to explore possibilities that there may be dysfunction in the central nervous system contributing to the risk, etiology, maintenance, and/or intractability of symptoms of eating disordered behaviors. She states that it is important to note that there are researchers who argue that neuropsychological studies have yet to produce an explanatory neurofunctional model of eating disorders. However, neuropsychological tests are now being used to assist with diagnosis, to obtain quantifiable data on the eating disorder condition, and to develop effective treatment plans.

Lastly, Dr. Jennifer Dunkin, reviews relevant findings from brain imaging, neuropsychology, and genetic research regarding the effects of aging and gender on cognition, brain structure and function in normal aging and dementia. She relates that the prevalence of age-related cognitive disorders is increasing dramatically, making it imperative to continue to focus research efforts on prevention and treatment. As has been the case in other research areas, only recently have investigators questioned whether the cognitive aging process affects men and women differently and the results cited in this chapter are surprising. While gender differences in brain structure and function during normal aging are remarkably small, gender exerts powerful differential effects on risk for different forms of dementia.

The reader may note an unusually large Appendix included in this handbook. The entire document of "Women's Health Care Competencies for Medical Students: Taking Steps to include Sex and Gender Differences in the Curriculum" was reproduced verbatim as a resource for neuropsychology professionals desiring a guide or template to determine the exact scope of competencies needed for working with female clients. While the document is geared towards the training of physicians it can be easily seen that most of the competencies translate efficiently into neuropsychology practice. The intent of the document, and its inclusion in this volume, is to illuminate the breadth and depth of issues surrounding sex and gender differences in health care and, more important, are evidence-based practices that improve treatment outcomes. The Association of Professors of Gynecology and Obstetrics (APGO) graciously granted us permission to reproduce the *Competencies* for our readers and their generosity is very much appreciated. Readers may also find many other excellent resources at the APGO website: <http://www.apgo.org>.

In terms of thanking those individuals associated with this project who were critical to its inception and fruition, this volume would not have been possible without the vision and patience of our Senior Editor at Springer, Janice Stern. Janice has a superior knowledge of the magical ways to support projects with busy authors. She is thanked for her expertise, advice, grace, style, and kindness: It did not go unnoticed or unappreciated!

The authors of this volume also need to be thanked. When approached with the project everyone was enthusiastic and interested in the outcome. They all came in on deadline, were cheerful about edits, and responded promptly to queries! This was definitely the "dream team" of authors for a handbook! The authors of the chapters in this volume have exemplary career records and they have all served the field, clients, and colleagues well for many years. This rare collective work is a statement

of their outstanding wisdom about what it means to be a woman and a statement of the level of competency that is needed to adequately treat women and achieve maximal treatment outcomes: Their contributions to this work are outstanding and greatly appreciated.

Cleveland, Ohio
March, 2008

Elaine Fletcher-Janzen

Contents

1 Introduction to the Neuropsychology of Women	1
Elaine Fletcher-Janzen, Margaret Semrud-Clikeman, Nancy L. Nussbaum, Phyllis Anne Teeter Ellison, Elaine Clark, LeAdelle Phelps, Jennifer J. Dunkin, and Catherine P. Cook-Cottone	
2 Brain Development: Evidence of Gender Differences	11
Phyllis Anne Teeter Ellison and Amy Nelson	
3 Neuroimaging in Women	31
Margaret Semrud-Clikeman, Jodene Goldenring Fine, and Jesse Bledsoe	
4 Women and Traumatic Brain Injury	69
Elaine Clark and Janiece L. Pompa	
5 Attention-Deficit/Hyperactivity Disorder	87
Nancy L. Nussbaum and Katherine N. Shepard	
6 The Neuropsychology of Dyslexia: Differences by Gender	131
Amy Nelson and Phyllis Anne Teeter Ellison	
7 Sex and Gender Differences in the Assessment, Treatment, and Management of Epilepsy	145
Elaine Fletcher-Janzen	
8 Critical Issues in Chronic Illnesses of Women	165
LeAdelle Phelps	
9 Neuropsychology of Eating Disorders	175
Catherine P. Cook-Cottone	
10 Aging and Gender	209
Jennifer J. Dunkin	

Appendix 225

Index 315

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