

## SYMPOSIUM

# Pediatric Head Injury: Developmental Implications

## Introduction from the symposium organizers

VICKI ANDERSON AND KEITH OWEN YEATES

This is the third symposium to be published in JINS. The idea for the symposium arose following the presentation of a group of papers on pediatric head injury at the February 1996 meeting of the International Neuropsychological Society in Chicago. During that paper session, speakers shared not only their research data, but also the methodological and conceptual dilemmas involved in evaluating the consequences of head injury in children. Several of these dilemmas occur as themes throughout the set of articles presented in the symposium.

One of the central themes is the importance of a developmental framework in the study of pediatric head injury. The symposium begins with a general introduction by Taylor and Alden, who address the question of age-related differences in the effects of childhood brain insults. The articles by Anderson, Ewing-Cobbs, Gronwall, and their colleagues question traditional notions of plasticity, which suggest that young children recover more readily than adults following cerebral trauma. Instead, the research presented here indicates that young children may be particularly vulnerable to head injuries. The importance of a developmental framework is also discussed from both a conceptual and methodological perspective by Yeates and his colleagues, who illustrate the use of individual growth curve analyses as an approach to modeling recovery from head injury.

To fully appreciate the complexity of the impact of pediatric head injury, a developmental framework must be integrated with consideration of biological and psychosocial influences on recovery. Outcome studies must consider the influence not only of age-related variables, such as test age, age at injury, and time since injury, but also of biological factors, such as injury severity and lesion size, and of psychosocial factors, such as family functioning and access to appropriate educational intervention. In the symposium, Levin and his colleagues address the influence of lesion size on executive functions, and Yeates and his colleagues study the moderating influence of the family environment on both cognitive and behavioral outcomes. In turn, Kinsella and her colleagues examine the influence of injury-related and neuropsychological factors on educational placement. Re-

searchers also must tease out expected developmental progress from recovery when interpreting any changes that occur postinjury. Thus, all of the articles in the symposium incorporate longitudinal designs and appropriate control groups, which help to differentiate developmental changes and practice effects from the changes that occur as a consequence of the head injury itself.

At a more technical level, measurement problems are also a major theme in the symposium. Difficulties arise even with respect to common measures of injury severity, such as the Glasgow Coma Scale or the Children's Orientation and Amnesia Test, because young children are not necessarily able to respond to the measures appropriately. The prospective evaluation of intellectual functioning and specific cognitive skills in young children is also hampered by the need to use different test measures, each possessing its own psychometric properties, with children of different ages. As Anderson and Ewing-Cobbs and their colleagues mention, changes in the tests that are administered raise concerns about the validity of comparing results obtained at different ages. The study of neuropsychological outcomes, where the subtle consequences of head injury are often most evident, is further constrained by the limited range of available tests, many of which lack adequate norms or are not sensitive across the entire age range of childhood. Levin and his colleagues present research on several purported measures of executive functions, and their results highlight some of the difficult measurement issues in that domain. Yeates and his colleagues also address the importance of measurement scaling in their discussion of growth curve analyses.

Research addressing the consequences of pediatric head injury has lagged behind the study of adult survivors. The articles included here reflect the many challenges for researchers who wish to study the effects of pediatric head injury. The studies span a wide range of ages within the pediatric population, and focus on various types of outcomes, ranging from specific intellectual and neuropsychological skills to more functional parameters such as educational and psychosocial functioning. They also incorporate predictors of outcome that extend beyond the usual measures of injury

severity to include detailed measures of lesion volume, as well as measures of the social and family environment. We believe that the research presented in the symposium represents the current state of the art, and that the findings in the individual studies provide important insights into the effects of pediatric head injury. However, the studies also highlight the need for more sophisticated conceptual and methodological approaches in the next generation of stud-

ies. We hope that the symposium helps to usher in those advances.

*Vicki Anderson*  
*University of Melbourne*

*Keith Owen Yeates*  
*The Ohio State University*  
*and Children's Hospital*