Psychopathology of Childhood and Adolescence
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Psychopathology of Childhood and Adolescence: A Neuropsychological Approach

Edited by

Andrew S. Davis, PhD, HSPP
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I would like to thank the authors of the *Handbook of Pediatric Neuropsychology* and the authors of the case studies in this book for their hard work and dedication to the field. Thanks as well to Nancy Hale of Springer Publishing for her patience and her vision in helping to formulate this book. Finally, I owe a debt of gratitude to all of my current and former students at Ball State University who continue to inspire me to keep learning about this exciting and growing field of study.
SECTION I: INTRODUCTION

CHAPTER 1

Introduction to the Neuropsychology of Childhood Psychopathology

Andrew S. Davis, Christopher W. Drapeau, Steven P. Malm, and Peter Dodzik

Psychopathology can be broadly defined as the study of psychiatric disorders and their effect on behavior, yet the definition of this term for children is much more complex. Although development continues throughout the lifespan, at no time is development more complex and dynamic than in childhood, which in this book encapsulates the time from conception through late adolescence. Thus, the study of childhood or developmental psychopathology poses additional challenges when compared to adult/geriatric psychopathology. Price and Zwolinski (2010) noted that childhood psychopathology “represents difficulties or failures in negotiating developmental issues and tasks … Thus, psychopathology represents some form of maladaptation that results in the individual’s deviation from age-appropriate norms” (p. 19). A neuropsychological approach to the study of childhood psychopathology allows clinicians and researchers to determine these deviations in processing domains and behavior essential for negotiating the developmental tasks that are necessary for what society considers to be healthy behavior. As of this writing, the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition-Text Revision (DSM-IV-TR; American Psychiatric Association, 2000) is the latest iteration of the text, which provides diagnostic criteria for psychiatric disorders. These books have broad implications for practitioners, researchers, and the general public as these diagnostic criteria affect reimbursement from insurance companies, determine the course of treatment for patients with psychiatric illness, classify participants for research, and reflect and influence societal viewpoints of mental illness. As such, the impact of diagnostic decision making has far-reaching implications, and review of previous editions of the DSM reflects the evolution of how society and the medical community have approached psychiatric disturbance and provides insight into the future of this field. Indeed, the fifth edition of the DSM will soon be published by the American Psychiatric Association and will update many of the conditions that are presented in the text for which this chapter serves as an introduction. This is an exciting time for those who study and use these diagnostic classifications given the forthcoming release of the (DSM-5; American Psychiatric Association, n.d.), as well as the wealth of research that has emerged over the last several years on the neurological basis and neuropsychological implications of these conditions. It could be argued that understanding the neuropsychological and neurological basis of these conditions represents not only the future of psychopathology, but also the area with one of the highest ceilings for amassing new insight into psychiatric disorders. Indeed, the improvements made in medical technology, especially in regard to functional neuroimaging techniques such as positron emission tomography (PET) and functional magnetic resonance imaging (fMRI), have allowed researchers to confirm beliefs that many common psychiatric conditions are associated with both functional and
structural changes in the brain. Thus, the purpose of this book is to provide an overview of recent research from a neuropsychological viewpoint of common childhood psychiatric disorders, childhood medical disorders, and other conditions that have an impact on psychiatric and cognitive functioning.

Clinical neuropsychology can be broadly considered the study of the relationship between central nervous system functioning/dysfunction and behavior. The National Academy of Neuropsychology defines a clinical neuropsychologist as a “professional within the field of psychology with special expertise in the applied science of brain-behavior relationships. Clinical neuropsychologists use this knowledge in the assessment, diagnosis, treatment, and/or rehabilitation of patients across the lifespan with neurological, medical, neurodevelopmental, and psychiatric conditions, as well as other cognitive and learning disorders. The clinical neuropsychologist uses psychological, neurological, cognitive, behavioral, and physiological principles, techniques, and tests to evaluate patients’ neurocognitive, behavioral, and emotional strengths and weaknesses and their relationship to normal and abnormal central nervous system functioning. The clinical neuropsychologist uses this information and information provided by other medical/health care providers to identify and diagnose neurobehavioral disorders, and plan and implement intervention strategies” (National Academy of Neuropsychology, 2001). Clinical neuropsychologists are interested in determining the presence, pattern, and extent of organic impairment and its impact on current and future behavior. This includes differential diagnosis of psychiatric conditions as well as considering the synergistic relationship between cognitive deficits and psychiatric functioning. Clinical neuropsychologists also incorporate other variables into their decision-making process, including environmental and psychosocial variables, medical variables, and educational/vocational variables. The outcome of the neuropsychological evaluation has the potential to be used for high-stakes decision making, including special education placement, disability determinations, legal decisions, medication determination, capacity decisions, and treatment recommendations. Thus, a complete understanding of the relationship between psychiatric disorders and central nervous system functioning is essential in ensuring that all variables are fully integrated when considering differential diagnosis and implications for intervention.

Pediatric neuropsychologists are clinical neuropsychologists who specialize in working with children and their families. Although pediatric neuropsychology can be considered a specialty within clinical neuropsychology, there are also areas of emphasis within the field of pediatric neuropsychology, with some clinicians and researchers who focus on specific medical conditions (e.g., cancer, traumatic brain injury, and seizures), perinatal complications (e.g., preterm birth and intrauterine toxicity) or childhood disorders such as autism and other pervasive developmental disorders. This is reflected in reviewing the research and clinical backgrounds of the authors of the chapters and case studies in this text.

A neuropsychological approach to the study of childhood psychopathology involves incorporating multiple factors into the process of diagnostic decision making and determining the functional implications of specific cognitive strengths and weaknesses. These factors include the child’s neuropsychological test data, parent and teacher report, psychosocial history, medical history, educational history, family history, consideration of the perinatal period, and current signs and symptoms. The process of conducting a neuropsychological assessment is beyond the scope of this text and interested readers are directed to Neuropsychological Evaluation of the Child (Baron, 2003), Handbook of Pediatric Neuropsychology (Davis, 2010), Neuropsychological Assessment (Lezak, Howieson, & Loring, 2012), and Pediatric Neuropsychology, Second Edition: Research, Theory, and Practice (Yeates, Ris, Taylor, & Pennington, 2009) or other books on this topic. The integration of medical, psychological, and environmental variables and their use in differential diagnosis, determination of functional capacities, and designing interventions based upon evaluation data represent
the neuropsychological approach to studying psychopathology. For example, neuropsychologists work in and among multiple settings in which they integrate their knowledge of the central nervous system and psychiatric functioning, including hospitals, outpatient mental health clinics, the United States Department of Veterans Affairs, and private practices. Neuropsychologists also contribute to school-based practices and the assessment and consideration of neuropsychological functioning in this setting melds well with the recent increase in evidence-based academic interventions; determining a child’s cognitive processing strengths and weaknesses allows for selection of more specific evidence-based interventions that can help determine why interventions succeed and fail for individual children.

Childhood psychopathology can be more complicated than adult psychopathology. The primary reason for this is the process of development. When working with adults who have psychiatric and neurological disorders, there is generally an assumption that the patient has achieved a certain level of development, and deviation from these expectations represent’s decline (see Lezak et al., 2004 for a discussion of species-wide performance expectations). However, it must be considered that development does not proceed at an equal rate for all children, and mild deviations from age-expected behavior may simply result from a lag in development. A noteworthy limitation of matching a description and observations of a child’s current and prior behavior to diagnostic categories is that the diagnostic categories may not be delineated between children and adults, let alone children of different ages. Given that childhood is a period of incredibly rapid central nervous system development, the diagnostic categories for adults may not match a child’s behavior, and behavior considered atypical for adults or for older children may be typical for younger children. Regarding this issue, Hudziak, Achenbach, Althoff, and Pine (2007) wrote the following: “Moreover, genetic findings and brain imaging document overlap among DSM categories whereby some genes and neural factors may confer susceptibility to disorders that belong to different DSM categories, such as anxiety and depression, as opposed to narrow DSM-defined conditions …. A taxonomy that employs the same diagnostic rules and cutpoints for a 17-year-old male and a 5-year-old female may not be sensitive to underlying neural correlates of psychopathology” (p. 8). A neuropsychological approach to differential diagnosis can help account for this difficulty by providing age-derived standard scores that quantify multiple domains of cognitive functioning in which deficits may be accounting for behavioral disturbance. There are also changes in the prevalence of psychiatric disorders as children pass through different developmental stages; for example, there are increased rates of depression, drug abuse, and panic disorder with decreased rates of attention deficit/hyperactivity disorder as children progress into adolescence (Costello, Copeland, & Angold, 2011).

Another complicating consideration in studying childhood psychopathology is the multifactorial explanations that may describe the presence of age-inappropriate behavior, which suggests a developmental delay. For example, a child exhibiting immature social behavior may be doing so because of a central nervous system infection, perinatal complication, sleep disturbance, anxiety, attention problems, parenting issues, exposure to previous trauma, pervasive developmental disorder, or a number of other possibilities. Thus, pediatric neuropsychologists and others working with children need to have extended knowledge about the factors that impact central nervous system development and incorporate them into their diagnostic decision making and treatment recommendations. Failure to do so could potentially lead to an inaccurate attribution to the cause of the condition which, in turn, could yield ineffective or maladaptive treatments.

While the DSM-IV-TR does an excellent job of elucidating psychiatric disorders, there are a wealth of medical disorders and other developmental complications that have the potential to impact cognitive and psychiatric functioning that are not fully encapsulated in the DSM-IV-TR. Although some of this may change with the upcoming publication of the DSM-5,
I. INTRODUCTION

Clinicians frequently encounter children with medical disorders and other conditions whose psychiatric and cognitive effects may not be fully explained in the *DSM-IV-TR*. A deficiency in the understanding of medical disorders’ effects can be problematic as the clinician may not fully understand the impact on the child’s social, emotional, behavioral, or academic functioning, overattribute the emotional difficulties to a medical condition and/or attribute a child’s difficulties to an unrelated medical condition. For example, central nervous system cancers and infections can have a distinct effect on a child’s functioning in multiple domains and clinicians who work with children should be fully aware of the impact. This should not be constituted as an attack on the *DSM-IV-TR*; rather, the point is being made that supplemental information is needed to capture the effects of medical disorders and other developmental conditions on functional areas that psychologists typically consider to be their domain. Additionally, it should be considered that as medical technology advances and explains in detail the etiology of psychiatric conditions, the role of the psychologist may change. Many conditions in the *DSM-IV-TR* are identified through a behavioral checklist and differential diagnosis is not fully dependent upon identifying the etiology of the condition. For example, work is being done on identifying possible genetic causes of autism (see Chapter 4 on Pervasive Developmental Disorders), yet we continue to diagnose autism by primarily considering a child’s behavior. Although this is currently appropriate, a time could be coming in which a simple blood test will be sufficient for accurate diagnosis. For example, the genetic basis of Rett’s syndrome is being uncovered and as such will likely not appear in the *DSM-5* (see Chapter 4 on Pervasive Developmental Disorders). It is interesting to speculate that the more we are able to identify genetic causes and/or risk factors for psychiatric conditions, the more the role of the psychologist will move away from differential diagnosis and focus more on treatment and prevention of environmental risk factors/promotion of environmental resilience factors that exacerbate or protect a child with a genetic predisposition to a condition.

The purpose of the current book is to provide students and practicing clinicians with additional information about psychiatric disorders from a neuropsychological viewpoint that impact children as well as information about conditions that affect psychiatric and cognitive functioning. As mentioned above, psychologists working with children who do not consider the effects that medical disorders and other conditions that affect cognition and psychiatric functioning can have on the totality of a child’s functioning are likely to miss part of the diagnostic or treatment picture. The importance of early identification and treatment of childhood psychopathology is highlighted by the emotional and financial toll that these conditions place on the child, the family, school systems, and the healthcare system (Hinshaw, 2008). This book was constructed by drawing chapters from the more extensive *Handbook of Pediatric Neuropsychology* (Davis, 2010) with the addition of 29 cases studies for psychiatric disorders, medical conditions, and other complications that impact the psychiatric diagnosis and treatment of children. Readers should approach the case studies with the intent of understanding that the neuropsychologist uses test data, history, and presenting symptoms to identify root causes, rule out other potential contributing factors and design treatment strategies. Case studies are also an important aspect of studying psychopathology from a neuropsychological point of view as most disorders discussed in the *DSM-IV-TR* do not have test scores as part of the diagnostic criteria and the case studies facilitate the application of neuropsychological test data.

The first section of this book serves as an introduction and a discussion of the role of neuroimaging in working with children. Neuroimaging is an excellent example of incorporating medical variables into the diagnosis and treatment of children as an area that will likely become more prevalent in the future. Indeed, the idea of directly viewing functional abilities of the brain has substantial appeal when the inherent flaws of psychological and
neuropsychological testing are considered; neuropsychological tests are currently used to extrapolate brain functioning from a patient’s performance on confrontational tasks and that process is susceptible to extraneous factors such as effort, motivation, fatigue, pain, culture, and environmental factors. As Lajiness-O’Neill, Pawluk, and Jacobson wrote in 2010 “While traditional measures have the advantage of allowing for standardized administration and portability as well as allowing for an important elaboration of a child or adolescent’s strengths and weaknesses, they lack the sensitivity and specificity necessary to identify the complexities of the neural substrates and potential aberrant connectivity that may underlie a disorder in the same way that a coupling of standard measures and neuroimaging may afford. Unfortunately, neuroimaging with children is a complex endeavor and there is a point of diminishing return with respect to the quality of the data that can be acquired as one moves down the developmental spectrum unless children are sedated. Over the next several decades, we are likely to see many advances in the development of neuroimaging technologies that will allow us to peer into brain-behavior relationships in children in unparalleled ways” (pp. 991,992). Another potential issue of using neuroimaging with children is the likelihood that significant neurofunctional deficits have occurred prior to the age when the condition is identified and behavioral changes have already resulted from the condition. In summary, despite the potential advantages of neuroimaging, the point where neuroimaging is readily available, cost effective, or as useful in identifying functional deficits that are an essential component of the neuropsychological evaluation has not been reached.

The second section of this book discusses disorders that appear in the first section of the DSM-IV-TR, disorders that are usually first diagnosed in infancy, childhood, and adolescence, as well as other psychiatric conditions, which affect children and adolescents. This includes conditions such as pervasive developmental disorders, attention deficit/hyperactivity disorder, learning disorders, communication disorders, and reactive attachment disorders. Although these conditions can be diagnosed in individuals of any age, they are primarily the domain of child psychologists as the symptoms typically first appear during childhood. This second section also discusses selected psychiatric disorders that can affect children including mood disorders, anxiety disorders, and substance abuse. These chapters discuss the background and history of the disorder, neuropsychological and neuroanatomical basis of the disorder, etiology, clinical presentation, considerations for neuropsychological assessment, and evidence-based interventions. These chapters provide readers with supplemental information to the information provided in the DSM-IV-TR in regards to considering a neuropsychological viewpoint. Following many of the chapters is a case study, which is conducted from a neuropsychological perspective. The case studies are designed to provide a practical example of how a clinician would conceptualize and evaluate the conditions discussed in the preceding chapters. This involves discussion of the history of the case, including psychosocial history, medical history, educational history, and family history. Pediatric neuropsychologists consider this information as essential when they are determining a child’s diagnosis and designing interventions; patient and/or family report and observation of current signs and symptoms, as well as neuropsychological test data, are greatly enhanced when considered in the context of the patient’s history. The case studies also contain neuropsychological assessment results. Perusing these cases will reveal that many of the clinicians who wrote case studies for this book take differing approaches to assessment, although the next section for each case study, the rationale for diagnosis, will illustrate how the author(s) incorporate the test data with the background of the case to arrive at a diagnosis. At the end of each case study, the reader will find a list of interventions that are designed to target the specific needs of the individual in the case study.

The third section of this book discusses medical disorders and conditions that can impact a child’s cognitive processing, as well as psychiatric functioning. The impact of cognitive processing on a child’s development cannot be overemphasized. The ability to effectively
process information, solve problems, use memory, make decisions, use and understand language, sustain attention, use visual-spatial skills, and employ effective sensory and motor skills can have a dramatic impact on a child’s social, academic, and behavioral development. Delays or deficits in these areas of cognitive processing domains can have a far-reaching effect; for example, motor skill delays could reduce a child’s ability to explore and interact with the environment, which could limit language or social development. This section discusses some of the more common conditions and disorders that can affect a young child’s neurocognitive development that in many cases will have a pervasive and lifelong effect and substantially alter the child’s developmental trajectory.

The development of the central nervous system is an extremely complex process and genetic and epigenetic factors can adversely affect development. The perinatal period is generally considered to start after conception and extend through birth and clinicians who work with children need to be increasingly aware of developmental deviations during this period. Indeed, improvements in medical technology have resulted in more children surviving complications during the perinatal period, including preterm birth (Norman, Morris, & Chalmers, 2009). However, preterm birth, along with low birth weight, is one of the most common causes of perinatal complications and has been linked to multiple future childhood conditions (see Chapter 22 on Preterm Birth). Decreased mortality resulting in increased morbidity means that more children are surviving formerly fatal circumstances, which results in more children needing to be treated for neurocognitive deficits. Additional research suggests that maternal health problems, including diabetes and obesity, have the potential to result in perinatal complications, which is concerning given the increasing prevalence of these conditions (see Chapter 20 on Perinatal Complications).

One of the most widely studied perinatal complications, as well as one of the most preventable, is intrauterine toxicity. This refers to toxic substances that are used by the pregnant mother, which can have an impact on the developing fetus’s central nervous system. This includes illicit drugs, as well as legal substances such as alcohol and cigarettes. Intrauterine toxicity is a tremendous problem as recent statistics suggest that between 3.6% and 4.6% of American women have used illegal drugs during pregnancy (van Gelder et al., 2010). Chapter 20 on Perinatal Complications reviews some of these toxic substances, including opiates, tobacco, and cocaine, as well as potential toxic substances such as legal, commonly used psychiatric drugs. Research has increasingly demonstrated a link between intrauterine toxicity and later development of childhood psychopathology. For example, maternal cigarette smoking seems to lead to an increased risk of a child having features of attention deficit/hyperactivity disorder (e.g., Linnet et al., 2005). Intrauterine exposure to alcohol is a particularly troubling situation given the easy availability to alcohol and the wide-reaching effects alcohol can have on the developing brain. Chapter 21 is devoted to fetal alcohol spectrum disorder, which contains up-to-date discussions regarding the changing terminology and implications of intrauterine exposure to alcohol.

The sensory and motor systems are good barometers of the integrity of the central nervous system and developmental problems with these systems can impact cognitive functioning. Therefore, clinicians need to be aware of the conditions that can result in sensory or motor disturbance, such as periventricular leukomalacia, the dystrophinopathies, and spina bifida. These conditions are excellent examples of medical conditions that are not fully covered in the *DSM-IV-TR*, yet have the potential for sensory, motor, psychiatric, and cognitive difficulties that certainly can impede development. This text reviews these conditions and discusses implications for assessment and intervention.

In addition to the environmental factors that affect development of the central nervous system such as maternal health, intrauterine toxicity, and maternal injury, we are learning more about the genetic factors that affect a child’s development and subsequent psychiatric...
and cognitive functioning. Children with conditions for which the genetic cause has been identified do not rely upon psychologists to provide differential diagnosis of their condition, yet psychologists encounter these children as they are likely to require interventions in multiple areas of functioning, including academic accommodations, behavioral management, and facilitation of social interaction.

The fourth section of this book is similar to the preceding section in that there are multiple conditions that psychologists may consider as the domain of the physician, yet these conditions can dramatically affect a child’s psychiatric and cognitive functioning; illness, disease, infection, toxic exposure, and acquired neurological insult affect children, as well as adults, and these conditions can irrevocably alter a child’s life. Some of the conditions in this section alter the course of a child’s development to the point that death or substantial neurological limitations can ensue. In these situations, psychoeducation and/or assistance with transitions can become an essential role of the psychologist. For example, children with traumatic brain injuries, even when they are mild, may have at least initial difficulties with aspects of the transition back to school and psychologists will be called upon to help educate school personnel as well as design/assist with strength-based interventions. Children with more severe traumatic brain injuries may only be able to return to school on a part-time basis or perhaps not at all and this can be a very difficult transition and adjustment for the both the child and the family. Other conditions included in this section can result in extended, multiple, or perhaps lifelong involvement with the medical profession, including frequent hospitalizations, which can impact social and academic development and result in behavioral problems, as well as distress. For example, children with central nervous system cancers, endocrine disorders, HIV and other infections are likely to require a high level of medical interventions. Additionally, each of these conditions has the potential to impact psychiatric functioning and cognitive abilities and the reader will find chapters detailing the neuropsychological implications, as well as several case studies that highlight assessment and intervention approaches.

CONCLUSION

The study of childhood psychopathology is a complex endeavor given the interplay between a child’s individual rate of development, environmental variables, medical history, and genetic risk and resiliency factors. A neuropsychological approach to differential diagnosis offers the clinician the opportunity to integrate central nervous system functioning into this dynamic, which provides a deeper understanding of the etiology of the child’s behavioral presentation. Although a neuropsychological approach is also useful when working with adults, it is particularly valuable when working with children. Relying upon reports of behavior without accompanying quantitative evidence is problematic when working with children because multiple sources of information are required (i.e., teachers, parents, and child reports) and agreement among these sources may be modest at best, which complicates classifying reports of psychopathology (Hudziak, Achenbach, Althoff, & Pine, 2007). Approaches to differential diagnosis in the future are likely to move away from an examination of current and past behavior toward more direct measurement of neurological structural and functional underpinnings of behavior as well as genetic factors although it is likely that analysis of environmental factors will also continue to play an important role. This book is designed to provide beginning and more experienced clinicians with an educative and reference book for a neuropsychological approach to considering psychiatric disorders that commonly affect children, as well as medical disorders and other conditions that impact psychiatric and cognitive functioning. Assessment of neurocognitive processing allows for a more comprehensive understanding of the basis of childhood psychopathology, as well as
providing a foundation to build strength-based interventions for social, emotional, academic and behavioral functioning.

REFERENCES