COMPREHENSIVE HANDBOOK OF PERSONALITY AND PSYCHOPATHOLOGY

VOLUME 3
CHILD PSYCHOPATHOLOGY

Robert T. Ammerman

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To the memory of Dr. Samuel M. Turner

Contents

Handbook Preface

Remarkably, the linkage between personality and psychopathology, although extensive, has not been underscored in the larger tomes on these subjects. In the last decade there have been many books on personality, adult psychopathology, and child psychopathology, but none seems to have related the three in an integrated fashion. In part, this three-volume *Comprehensive Handbook of Personality and Psychopathology* (CHOPP), with the first volume on *Personality and Everyday Functioning,* the second on *Adult Psychopathology,* and the third on *Child Psychopathology,* is devoted to remedying this gap in the literature. Another unique feature of CHOPP appears in the volumes on *Adult Psychopathology* and *Child Psychopathology,* where impact of adult and child psychopathology on family, work, school, and peers is highlighted, in addition to the relation of specific psychopathology to normal development. Given the marked importance of such impact, contributors were asked to delineate the negative impact of psychopathology on the individual's daily environments.

In light of the aforementioned features, we trust that CHOPP is timely and that it will be well received in many quarters in psychology. The work should stand as an entity as a three-volume endeavor. However, given the structure of each volume, we believe that it is possible to break up the set into individual volumes for relevant courses on personality, normal development, adult psychopathology, and child psychopathology.

Volume 1 (*Personality and Everyday Functioning*) contains 23 chapters divided into four parts (Foundations, Broad-Range Theories and Systems, Mid-Range Theories, and Special Applications). This volume is unique in that it encompasses both the broad theories of personality and those theories with a more limited range, known as mid-range theories. Broad-range theories were originally developed to explain the behavior of normal people in everyday situations. But it also is important to have a reference point for those individuals suffering from various sorts of psychopathology. Chapters in this section follow a general format where possible:

A. Statement of the Theory
B. Developmental Considerations
C. Biological/Physiological Relationships
D. Boundaries of the Theory
E. Evidence in Support of and against the Theory
F. Predictions for Everyday Functioning
    1. Family Life
    2. Work or School
    3. Retirement
    4. Recreation

Thus, Volume 1 sets the stage for Volumes 2 and 3 while at the same time standing on its own for understanding everyday life from the personality perspective.

Volume 2 (*Adult Psychopathology*) contains 30 chapters divided into three parts (General Issues, Major Disorders and Problems, Treatment Approaches). Volume 3 (*Child Psychopathology*) contains 27 chapters divided into three parts (General Issues, Major Disorders and Problems, Treatment Approaches). As previously noted, a unique feature in these volumes is mention of the impact of psychopathology on the family, work, school, and peers, often neglected in standard works. In both Volumes 2 and 3, most of the contributors have adhered to a relatively standard format for Part Two. In some instances, some of the authors have opted to combine sections.

A. Description of the Disorder
B. Epidemiology
C. Clinical Picture
D. Etiology
E. Course, Complications, and Prognosis
F. Assessment and Diagnosis
G. Impact on the Environment
    1. Family
    2. Work or School
    3. Peer Interactions
H. Treatment Implications

In addition, authors in Volume 3 include the sections Personality Development and Psychopathology and Implications for Future Personality Development. We trust that the relatively uniform format in Part Two of Volumes 2 and 3 will make for ease of reading and some interchapter comparisons within and across volumes.

Many individuals have worked very hard to bring this series of volumes to fruition. First, we thank our editor at John

Wiley, Tracey Belmont, for once again understanding the import and scope of the project and having confidence in our ability to execute in spite of interfering hurricanes, other natural events, and varied life events. Second, we thank our editors of the specific volumes for planning, recruiting, and editing. Third, we thank our eminent contributors for taking time out from their busy schedules to add yet one more writing task in sharing their expertise. Claire Huismann, our project manager at Apex Publishing, deserves special recognition for her extraordinary efforts, competence, and patience throughout the creation of this series. And finally, but hardly least of all, we thank all at John Wiley and Pacific University, including Carole Londeree, Linda James, Alison Brodhagen, Greg May, and Cynthia Polance, for their excellent technical assistance.

Michel Hersen and Jay C. Thomas
Forest Grove and Portland, Oregon

Preface to Volume 3

In the past decade, our understanding of the origins, manifestations, and course of child psychopathology has dramatically increased. It is clear that most adult psychopathology emerges in childhood. Delineation of the processes by which psychological and psychiatric disturbance develop and change over time has important implications for treatment and prevention. There are several unique issues in examining childhood psychopathology. First, psychopathology must be considered against the backdrop of unfolding developmental processes. Indeed, the field of developmental psychopathology explicitly acknowledges and emphasizes the juxtaposition of maturation and development and the emergence of psychological and psychiatric disturbance and has greatly contributed to advances in our understanding of child disorders. Second, changes in development over time require methodological procedures that include longitudinal designs, measurement that is developmentally appropriate and psychometrically sound, and assessments that use multiple methods and informants. And third, contextual factors have enormous influence over the etiology, course, and presentation of psychopathology. Poverty, trauma, exposure to violence, and parental mental illness are but a few of the most important ecological determinants of long-term outcomes in children.

The overarching purpose of this book is to examine the relationship between personality and child psychopathology. Traditionally, these domains have been viewed as separate and distinct. Yet, recent research and new theoretical conceptualizations have documented the synergistic and integrated ways in which they influence each other. In fact, early personality traits (such as temperament and behavioral inhibition) are now believed to be precursors to the development of childhood disorders. The stable nature of personality also impacts the course of disorders, vulnerability to comorbidity, and response to treatment. Thus, a book devoted to the consideration of both personality and psychopathology in childhood is timely as well as practical. The 27 chapters of this book are divided into three parts. Part One, General Issues, examines areas important to understanding child development in general and the emergence of psychopathology in particular. These include chapters on diagnosis and classification, genetics, pediatric neuropsychiatry, cognitive and behavioral considerations, sociological contributions, temperament and early personality development, infant mental health, and developmental psychopathology. Part Two, Major Disorders and Problems, includes chapters on generalized anxiety disorder, social anxiety disorder, post-traumatic stress disorder, major depression, bipolar disorder, mental retardation, pervasive developmental disorders, learning disorders, oppositional defiant disorder, conduct disorder, attention-deficit/hyperactivity disorder, eating disorders, substance use disorders, child physical abuse and neglect, child sexual abuse, and somatization disorders. Part Three, Treatment Approaches, contains chapters covering psychodynamic, cognitive-behavioral, and pharmacological treatments.

Authors have drawn on their respective literatures to construct chapters that reflect recent scientific advances and state-of-the-art clinical approaches. Moreover, authors in Chapters 9–24 have used a predetermined format that includes the following headings: Description of the Disorder/Problem and Clinical Picture; Personality Development and Psychopathology; Epidemiology; Etiology; Course, Complications, and Prognosis; Assessment and Diagnosis; Impact on Environment (Family, School, Peer Interactions); Implications for Future Personality Development; and Treatment Implications.

A number of individuals have assisted in bringing this book to fruition, and we acknowledge their help and support. We are especially grateful to the contributors to this book for sharing their expertise and insights. Our editor at John Wiley & Sons, Tracey Belmont, was instrumental in shaping the scope and breadth of this book. Her patience and guidance in bringing the book to fruition is appreciated. We also extend our thanks to Pam Malone, who assisted in the various stages of compiling the book. Finally, we wish to express our sadness at the untimely death of Dr. Samuel M. Turner, a contributor to this book. Dr. Turner was a consummate scholar and a major figure in child and adult psychopathology. He will be sorely missed, and we extend our condolences to his family, friends, and colleagues.

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PART ONE

GENERAL ISSUES

CHAPTER 1

Diagnosis and Classification

LEIGH ANNE FAUL AND ALAN M. GROSS

INTRODUCTION

Classification is among the first steps in scientific methodology, accompanying observation and description of the phenomena of interest. In psychology, classification is the process by which behavior is categorized along a spectrum of abnormality. Classification organizes and conveys information to aid in clinical decision making and interpretation of data (e.g., base rates or prevalence rates of disorders in the general population). Classification allows for comparison of differences in functioning among individuals by providing a uniform taxonomy. Acting also as an heuristic to empirical investigation, classification facilitates understanding of the nature and causes of psychological disorders. A widely recognized and utilized classification system of behavior is very important to enhance communication and understanding among professionals in the research as well as the clinical and applied fields of psychology. Thus, classification is critical so that psychology can move from scientific identification of similarities and differences in human behavior to span subsidiary objectives such as understanding of symptom array, etiology, epidemiology, prognosis, and treatment of specific disorders.

Within applied psychology, classification takes the specific form of diagnosis. To diagnose means "to distinguish or to know apart" (from the Greek *dia,* "apart," and *gignoskein,* "to know"). Diagnosis permits the assignment of cases to categories of a classification system of disorders or diseases. Diagnostic criteria are used to rule cases into or out of diagnostic categories. Diagnosis comprises the formulation of suppositions about a problem or disorder, serving as the foundation upon which a functional assessment is conducted and a treatment plan is devised (Hayes & Follette, 1992).

Diagnostic classification begins with one of two primary processes: inductive methodology or deductive methodology. In clinical psychology, these two processes reflect differences between the idiographic approach and the nomothetic approach (congruent with inductive and deductive reasoning, respectively; Cone, 1988). In the inductive, also called bottom-up, approach, one accrues multiple observations of behavior, spanning the range of normality and abnormality, and aligns these along dimensions of congruency, creating a taxonomy that serves as the basis for additional observations and the inception and formulation of a theory. Within the deductive, or top-down, approach, developing theories of psychopathology (based on clinical observations) are used to formulate categories, criteria, and future data collection that either substantiate or refute the theory. Classification and diagnosis of pathological behavior lie within a nomothetic framework. Definitions of adaptive and maladaptive behavior are formed via deductive methodology. The purpose of this chapter is to review basic principles, historical and current systems, special concerns and issues, and methodology within diagnosis and classification of childhood psychopathology.

PRINCIPLES OF PSYCHOPATHOLOGY

Defining Normal Behavior

In psychology, no consensus exists as to what constitutes normal behavior. The operational definition of adaptive behavior is a default; functionally, it is the absence of abnormal behavior. Defining psychopathology as aberration while normality and its boundaries (from which maladaptive behavior is said to deviate) are left unspecified is inherently problematic. Given that psychology did not begin with a conceptualization (either theoretical or empirical) of normal behavior, there is no standard taxonomy with which to define, identify, and investigate deviations. Though broad parameters have been posited, no single classification system of adaptive behavior has been widely adopted (Adams & Cassidy, 1993; Buss, 1966; Jahoda, 1958). There are numerous definitions of adaptive behavior. *Normal behavior* generally is viewed as what people do and wish to do weighed against what is required by the environment (Wicks-Nelson & Israel, 1991). *Mental health,* an outcome of consistent patterns of adaptive

behavior, is in part made up of the ability to think logically and rationally, to cope effectively with life events, and to display emotional stability and growth. These conceptualizations form loose guidelines that help to delineate maladaptive behavior (Wicks-Nelson & Israel, 1991).

Defining Psychopathology

Terms such as *abnormal behavior* and *psychopathology* span a wide variety of difficulties, from reduced competence in the completion of daily tasks to reality-defying delusions. Describing behavior as maladaptive generally implies that a problem behavior is being exhibited, with resultant difficulties in daily living and distress on the part of the individual or others (i.e., inability to cope, exceptional stress or distress, or feelings of vulnerability). Different approaches from statistical to theoretical have been used in the endeavor to produce a coherent classification system for psychopathology.

A conventional way to define deviant behavior is assessment of its occurrence (frequency, duration, and intensity) within the general population. This can be accomplished via a categorical or dimensional approach. Psychopathology has been defined by two basic methodologies: the class model and the multivariate model. The class or qualitative difference model operates under the tenet that some disorders or behaviors do not occur in the general population. This categorical-type model assumes that, within a given subset of the population, symptomatologies of disorders covary in distinct patterns and are functionally related (Adams, Luscher, & Bernat, 2001).

Conversely, the multivariate model of psychopathology places all behavior on a continuum. Deviant behavior is posited as dimensional, present in every individual to some degree. The multivariate model uses two criteria to define psychopathology: (1) establishing that a behavior pattern is deviant or rare; and (2) demonstrating that behavior patterns are clinically significant, causing objective or subjective distress to the person or others. The first criterion, labeled deviance, is relative, varying by culture, time, and location. The second criterion, adjustment, is a measure of how well individuals cope with environmental milieus. Wakefield's supposition of "harmful dysfunction" has replaced the criterion of adjustment (1992). Thus, psychopathology is conceptualized as behavior that in some way violates social norms and causes dysfunction in a subset of the population who exhibit behavior at problematic and clinical levels.

Attempts to define maladaptive, deviant, or disordered behavior historically have been as abundant as they have been controversial, resulting in added confusion rather than much-coveted clarification. From stigmatization, labeling effects, and reification to the imperfection of diagnostic categories (i.e., overlap of symptoms across disorders, indistinct boundaries between disorders), numerous criticisms have been leveled at the classification of abnormal behavior. Despite criticism and controversy, tremendous progress has been made in the last 25 years in classifying abnormal behavior. With increasingly defined goals and a history of refinement, diagnosis and classification of childhood abnormal behavior have shown marked improvement.

DIAGNOSIS AND CLASSIFICATION: THEN AND NOW

Historical Antecedents

The need to classify types of human behavior predates written records. From the bodily humors of Hippocrates and Galen (i.e., melancholic, phlegmatic, choleric, and sanguine) to Gall's phrenology and Sheldon's phenotypes (i.e., mesomorph, ectomorph, endomorph), many cultures ascribed individual behavioral tendencies to physical characteristics. This was the dominant trend in diagnosis and classification until the late 1890s. In 1899, Emil Kraepelin made a pivotal contribution to psychological classification, publishing the sixth edition of *Textbook of Psychiatry,* which listed 16 major categories of psychopathology. Kraepelin's diagnostic model serves as the framework for current diagnostic systems. Based on Kraepelin's model of classification, the first diagnostic system of the American Psychiatric Association (*Standard Classified Nomenclature of Diseases,* 1933) included 24 categories of adult psychopathology.

Current Systems

The Diagnostic and Statistical Manual of Mental Disorders

The Diagnostic and Statistical Manual of Mental Disorders (*DSM*) is the most widely adopted classification system of mental disorders. It contains standard terms and definitions that mental health professionals use in research and treatment. First published in 1952 by the American Psychiatric Association, the *DSM* has undergone a series of revisions as current knowledge has been incorporated. In the first edition, 108 diagnoses were outlined within three major classes of psychopathology: organic brain syndromes, functional disorders, and mental deficiency. Disorders of childhood and adolescence were largely excluded. Only one diagnosis specific to children was detailed, adjustment reaction of childhood and adolescence (APA, 1952).

The second edition of the *DSM* (APA, 1968) expanded the number of categories from 8 to 11 and the number of diagnoses from 108 to 182. More importantly, this edition included a diagnostic section devoted to children, "Behavior Disorders of Childhood-Adolescence." Diagnoses listed in this section included unsocialized reaction, withdrawing reaction, overanxious reaction, group delinquent reaction, aggressive reaction, runaway reaction, and hyperkinetic reaction.

The first two versions of the *DSM* were characterized by vague and unreliable diagnostic criteria. *DSM-III* (APA, 1980) represented a major improvement over previous editions with the inclusion of specific criteria (using a categorical scheme), a multiaxial system of classification, and the removal of unsupported theoretical inferences. Five axes—clinical syndromes, personality disorders and developmental disorders, physical disorders and conditions, psychosocial stressors, and global assessment of functioning—and 265 diagnoses were included. The multiaxial system allows for diagnosis and assessment of functioning in a broader and more meaningful sense in that it encompasses a basic description and diagnosis of the presenting difficulty as well as its effects within and across individual, family, and community contexts.

The trend of increasing diagnostic specificity was evident in the revision of the *DSM-III* (*DSM-III-R,* APA, 1987). Empirical findings were emphasized as operational criteria for disorders were developed. Moreover, disorders related specifically to children and adolescents were placed in a section titled "Disorders First Evident in Childhood or Adolescence." The *DSM-III-R* specified five major diagnostic categories of childhood problems.

Similar to the *DSM-III-R,* the most recent editions of the *DSM* (*DSM-IV,* APA, 1994; *DSM-IV-TR,* APA, 2000) use operationally defined criteria and empirical findings in delineating diagnostic entities. A number of major changes are also found in these editions. These include the assimilation of several child categories within corresponding diagnoses formerly only for adults (e.g., avoidant disorder of childhood has been incorporated within social phobia) as well as the addition of new categories. Interestingly, despite emphasis on empirical literature, a focus on situational and contextual factors is noticeably absent in these editions (Scotti, Morris, McNeil, & Hawkins, 1996).

Despite its widespread acceptance in both research and practice, the *DSM* has been criticized for a number of issues. Criticisms of the *DSM* classification system include its exclusion of a definition of normality, lack of emphasis on situational and contextual factors that precede and maintain behavioral difficulties, overlap of symptom criteria across diagnostic categories, and high comorbidity rates among disorders. Additionally, the tendency toward reification of disorders (i.e., when a psychological disorder is viewed as a causal agent rather than a convenient, descriptive label for exhibited symptomatology) is also criticized, although this is an artifact of usage rather than an inherent design flaw.

International Statistical Classification of Diseases *and Related Health Problems*

The first *International Classification of Diseases* (*ICD*), formalized in 1893 as the *Bertillon Classification* (later titled *International List of Causes of Death*), was intended to provide physicians and researchers a standard format for presentation of epidemiological statistics on physical conditions (specifically, mortality and morbidity rates). In 1948, a classification system for mental disorders, complete with diagnostic categories and symptom criteria, was included in the sixth edition of the *ICD* (World Health Organization, 1948). The newly included section for mental disorders comprised 10 categories of psychoses; 9 categories of psychoneuroses; and 7 categories of disorders of character, intelligence, and behavior. This addition allowed the *ICD* to function as an inclusive diagnostic classification system, spanning both mental and physical problems. Since its inception, the *ICD* has undergone revision roughly once every decade. The *ICD-10,* the most recent edition, is compatible with the most widely used classification system of mental disorders, *DSM-IV.*

Ancillary Classification Systems

Supplemental classification schemes have been suggested to augment the scope of diagnostic classification. Some of these supplemental systems address oversights in the *DSM.* Independent classification systems for young children (specifically, ages 0–3) have been devised to supplement the *DSM,* addressing the paucity of diagnostic criteria and consideration of this age group in the current edition of the *DSM.* For example, the National Center for Clinical Infant Programs developed the *Diagnostic Classification: 0–3* (*DC: 0–3;* Zero to Three/National Center for Clinical Infant Programs, 1994), a multiaxial system for classifying problems occurring in early childhood and spanning multiple domains of functioning. The *DC: 0–3* has five axes spanning functional emotional developmental level, relationship disorder, primary diagnosis, psychosocial stressors, and medical and developmental problems. The *DC: 0–3* is similar to the *DSM-IV* in the inclusion of similarly named disorders, such as traumatic stress disorder, disorders of affect (subtypes of anxiety and depression), adjustment disorder, sleep behavior disorder, and eating behavior disorder (Dunitz-Scheer, Scheer, Kvas, & Macari, 1996; Thomas & Clark, 1998). However, not all

of the ancillary systems employ a categorical approach to classification, nor do they correspond to the *DSM-IV* (1994).

Based on the tenet that human behavior can be examined along a number of independent dimensions, dimensional classification systems have been developed. One of the most widely recognized systems is the Child Behavior Checklist (CBCL), an empirically based dimensional system developed by Thomas Achenbach (Achenbach & Edelbrock, 1981; Achenbach, 1991). The Child Behavior Checklist-4–18 and 1991 Profile (CBCL-4–18) combines a 113-item behavior-problems checklist with a seven-part social competency checklist. Parental responses to both checklists result in comprehensive descriptions of child behavior that clinicians can use to distinguish between typical children and those having significant behavioral disturbances. The scoring profile for the CBCL-4–18 includes (a) three competence scales (activities, social, and school); (b) a total competence scale score; (c) eight syndrome scales (aggressive behavior, attention problems, delinquent behavior, social problems, somatic complaints, thought problems, anxious-depressed, and withdrawn); (d) an internalizing problem scale score; (e) an externalizing problem scale score; and (f) a total problem scale score. Unlike the *DSM* diagnoses, the CBCL syndromes are entirely empirical in their derivation, based upon repeated and comprehensive analyses of parent ratings of children's behaviors. The checklists are part of a larger effort by Achenbach (1993) to create an empirical taxonomy of behavioral disturbance in which syndromes describe features of behavior that co-occur in children, and profiles represent combinations of syndromes that occur at greater than chance levels. The CBCL checklists and syndromes have become a standard against which many other clinical decision-making tools are compared (Edelbrock & Costello, 1988).

Using a dimensional approach, Reynolds and Kamphaus (1992) developed the Behavioral Assessment Scale for Children (BASC). Responses to questionnaires from multiple informants result in the identification of symptom clusters organized across broad dimensional syndromes (internalizing problems, externalizing problems, behavioral symptoms index, emotional symptoms index, clinical maladjustment, school problems, clinical adjustment, and others). Additionally, narrower problematic behavior clusters, within the broad dimensional syndromes, are also delineated (e.g., aggression, hyperactivity, and conduct problems within externalizing problems) (Reynolds & Kamphaus, 1992). These and other ancillary classification systems are useful as supplementary sources of diagnostic information.

Reliability, Validity, and Clinical Utility

Reliability, validity, and clinical utility are benchmark indicators of the efficacy and accuracy of any diagnostic system. (These three standards [reliability, validity, and clinical utility] can also be applied to the specific assessment tools or methods used in the diagnostic process.) Reliability refers to the consistency with which clinicians apply the same categories or diagnoses to describe a child's behavior. Reliability also relates to the consistency of a diagnostic category over time. In the past, diagnostic reliability has been problematic. Interrater agreement (i.e., interrater reliability) is acceptable for a majority of the major *DSM-IV* childhood categories; lower levels of reliability are found when examining diagnostic agreement within *DSM-IV* childhood subcategories (Frick et al., 1994; Lahey et al., 1998; Werry, 1992). The specific assessment instruments used in an evaluation often determine the level of diagnostic reliability (Scotti & Morris, 2000). Diagnostic reliability has markedly improved with increased specificity of diagnostic criteria (within the *DSM-IV*) and the use of standardized assessment instruments.

Validity generally refers to issues of correctness, meaningfulness, and relevancy (Werry, 1992). It relates to the ability of a diagnostic system to measure what it has been designed to measure. Although there is general acceptance of the validity of *DSM* diagnostic categories, questions of validity remain as the result of the frequently reported observation of comorbidity of disorders. Comorbidity exists when individuals simultaneously meet criteria for more than one diagnosis or disorder (e.g., anxiety and depression). The rate of comorbidity in childhood disorders is relatively high (Angold, Costello, & Erkanli, 1999; Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Ford, Goodman, & Meltzer, 2003; Jensen et al., 2002; Lillienfeld, 2003; van Dulmen et al., 2002; Volkmar & Woolston, 1997; Werry, 1992) and may be due in part to symptom overlap (overlapping definitional criteria). A number of *DSM* disorders share common features and criteria. Other explanations for this problem include distinct disorders sharing a common vulnerability factor, or that comorbidity is an artifact of a classification system that allows two diagnoses to be assigned to what may be one disorder.

In addition to content validity, external validity is also important to classification systems. Diagnoses should provide information regarding prognosis, etiology, and treatment (i.e., predictive validity). Evidence for this comes from the development of empirically supported treatments (Chambless et al., 1996), such as those for phobic and anxiety disorders in childhood (American Psychological Association Division 12 Task Force, 1995; King, Hamilton, & Ollendick, 1994; Lonigan, Elbert, & Johnson, 1998; Ollendick & King, 1998). Recent advances in diagnostic conceptualization (Barlow, Allen, & Choate, 2004) have posited a common mechanism underlying the emotional disorders (as evidenced by comorbidity rates and commonalities in etiology and structure).

Specifically, an underlying syndrome of negative affect has been posited in anxiety and depressive disorders and within all anxiety disorders (Barlow, Allen, & Choate, 2004). With a reconceptualization of concomitant disorders (e.g., anxiety and depression) comes the possibility of attenuated comorbidity rates and improved external validity as well as more efficacious treatments. Diagnostic validity and comorbidity are being addressed by continuing theoretical and empirical work (Brestan & Eyberg, 1998; Kazdin, 1997; Pelham, Wheeler, & Chronis, 1998). It is important that clinicians cultivate an accurate understanding of validity and comorbidity, especially as these factors relate to the quality of current diagnostic systems.

A classification system is also judged by its clinical utility. Clinical utility refers to the degree of completeness and usefulness of a diagnostic system. Kendell (1989) stated that "diagnostic terms are no more than convenient labels for arbitrary groupings of clinical phenomena" and that these are "concepts justified only by their usefulness" (p. 51). Clinical utility is implied through modifications made to the existing classification system (measure of flexibility and responsiveness to change) and the development of alternative forms of classification. Critics have argued that diagnostic classification provides no explanation of the child's difficulties or necessary steps for remediation. However, by providing a method of systematically grouping behavioral disorders, the *DSM* has facilitated efforts to systematically examine the etiology of complex behavior problems. Moreover, the clinical utility of the *DSM* is also reflected in the recent emphasis on the development and use of empirically supported treatments corresponding to specific diagnoses.

ISSUES AND CHALLENGES

Pragmatic Considerations

Working with a clinical child population raises specific issues. It is important that professionals have knowledge of both the diagnostic tools being utilized as well as issues and guidelines unique to conducting evaluations with children. Unlike adults who seek treatment for problems, children participate in assessment and treatment as a result of the concerns of parents, teachers, or both. Children are often incapable of understanding the assessment process. It is important that clinicians make every effort to ensure that the child and parents understand the purpose and the process of the diagnostic evaluation. The primary goal is to improve daily functioning at home, at school, and in the community. It is important to express this clearly to children given that they might mistake the evaluation's purpose (e.g., they might believe they are in trouble), potentially causing them distress and possibly affecting their cooperativeness. Clarifying the purpose of the assessment and the process by which it will be achieved should be one of the initial steps in the evaluation.

Establishing good rapport between the child and the clinician is essential to successful child evaluation. A child who is uncomfortable with or mistrustful of the clinician might not respond openly to questions, resulting in an inaccurate picture of functioning. The clinician should display qualities such as warmth, openness, and empathy toward the child to help alleviate anxiety. Asking simple, direct questions also will aid the clinician in improving the assessment experience for the youngster (as well as increasing the quality of information he or she provides). Spending time talking with the child about his or her interests, or playing a game the child enjoys, can be used to promote rapport. Regardless of the method chosen, the clinician should make concerted efforts to ensure that rapport is established early and maintained throughout the diagnostic process.

It is important that the child's interest and motivation be maintained across the assessment. Results might also be compromised if the assessment is overly tiring or taxing. The child's age and developmental level should be taken into account when deciding the administration format of the evaluation. It may be necessary to schedule the assessment across several days to avoid the effects of fatigue and waning enthusiasm or cooperation.

Ethical Issues

In addition to pragmatic and practical issues, clinicians must also bear in mind numerous ethical issues in childhood diagnostic classification. Maintaining confidentiality of information is an important matter. As will be addressed later, multiple informants are often used in the assessment of children. In addition to family members (parents, siblings) serving as informants, assessment data may also be requested of the child's teachers, day care staff, or other relevant adults. When requesting these data, clinicians must take care not to reveal sensitive information. This can be particularly challenging as these individuals may request some explanation concerning why they are being asked to provide this information. Additionally, ensuring that the family and child understand the limits to confidentiality as well as how their private information is to be managed is key. It is beneficial to clarify the boundaries of confidentiality when reviewing the format of the evaluation.

Another ethical dilemma involves balancing the need to maintain good rapport with a child against the need to notify parents of risky behavior. Although this issue may not interfere with data collection during the diagnostic evaluation, it

may have a significant impact on a youngster's responsiveness to working with the clinician in therapy. Suicidal ideation, abuse, and victimization are clear-cut examples of events to report to parents. The decision is more ambiguous in situations where a child endorses engagement in risky behavior such as unprotected sex, drug or alcohol experimentation, truancy, or violations of curfew. As such, it is important at the outset of the diagnostic process to outline confidentiality and its terms to both the child and his or her parents. To help preserve rapport and engender trust, it may be useful to consider explaining to both the child and the parents that if confidentiality is to be broken (e.g., if the clinician decides to notify parents of certain behavior a child is displaying), the clinician will discuss it with the child before informing the parents.

Cultural Considerations

It is increasingly important that psychologists possess the knowledge and skills necessary to work effectively with ethnically diverse populations. This is especially true in diagnostic classification of ethnic minority children and adolescents. Cultures vary in their definition of acceptable and deviant behavior. Strong cultural values may influence children and parents in what symptoms they develop, how they understand the symptoms, coping methods, and use and satisfaction with diagnostic and clinical services (Canino & Spurlock, 2000). Parents of one ethnicity may be more likely to view and report certain behaviors as more problematic relative to other ethnicities. Failure to understand cultural practices and beliefs can result in incorrect diagnoses. As such, it is important to consider cultural differences when interpreting parent reports used in formulating diagnostic and treatment recommendations.

Great diversity exists within any cultural group, especially in terms of level of assimilation into mainstream culture. This is problematic in that clinicians are left to decide what factors and norms are most relevant in evaluating and understanding the child's problematic behavior. As such, clinicians should be aware of within-group ethnic and cultural diversity as well as between-group cultural differences when making a diagnosis. In addition, ethnically diverse children might also experience poverty, discrimination, and conflicts with assimilation into the larger culture. For example, poverty and history of discrimination could evoke wariness in the child or parents, causing some hesitancy to cooperate fully with the clinician and thus affecting the accuracy of the diagnosis. In some cases, parents might seek an evaluation not because of what the clinician would consider to be symptoms of psychopathology, but because their child is exhibiting behavior congruent with majority cultural norms and incongruent with their native cultural practices.

Ethnic minorities are underrepresented in mental health research, thus hampering the development of culturally inclusive diagnostic methods (Rogler, 1996). Behavioral and developmental differences due to culture, ethnicity, and socioeconomic status remain largely unexamined in diverse populations. The absence of culturally relevant data concerning behavior problems has resulted in default, and perhaps inappropriate, comparisons to Euro American (white) children as the normative sample (Sue & Sue, 1999). Clinicians who work with ethnically diverse children are at a disadvantage as there are limited data to shape diagnostic formulations in a culturally informed manner (Sue & Sue, 1999). Until an adequate culturally diverse empirical diagnostic research base exists, clinicians must make every effort to recognize the potential impact of cultural variables on the diagnostic process. Moreover, this must be done without making broad generalizations about cultural variables or losing sight of the role of regional, generational, and socioeconomic factors on these variables.

Language poses an additional challenge in the diagnostic classification of ethnically diverse children. When the clinician is not fluent in the primary language of the child and parents, the potential for communication problems is great. Language differences may lead to miscommunication concerning the delineation of symptoms, difficulties identifying the contingencies supporting problem behaviors, and a failure to recognize the significance of symptoms for the individual and his or her family. Obviously, communication problems set the stage for misdiagnosis. Having an examiner present who is familiar with both the clients' native language and with diagnostic terminology may minimize these potential hazards.

Developmental Considerations

In the early stages of the field of child clinical psychology, theories of adult psychopathology were unsuccessfully applied to childhood problems. Theory and taxonomy were primarily devised by an extension of adult models downward while developmental contexts were disregarded. Within the last 15 years, professionals have begun to integrate a developmental perspective in the study of child psychopathology.

To accurately judge the significance of problem behaviors, it is necessary to have a solid understanding of normal child development. Behaviors considered typical at one age are deemed problematic at another age or developmental level. For example, oppositional behavior and enuresis are not regarded as significant problems for 2-year-olds, whereas they

are considered significant difficulties in 11-year-olds. Similarly, determining the meaning of various child behaviors also requires consideration of the youngster's intellectual capabilities. Children with attenuated or impaired cognitive abilities cannot be expected to function at the same levels as children of normal intelligence across all areas of development. Moreover, children are often referred because they exhibit problems in academic settings. Though it may be that behavioral difficulties are interfering with learning, cognitive problems (e.g., a reading disorder or developmental delay) might prompt a child to display behaviors designed to promote avoidance of or removal from challenging tasks or environments. Failure to consider cognitive and developmental variables could compound problems the child is experiencing. Familiarity with norms concerning cognitive, physical, and social development facilitates interpretation of their impact on presenting behavior, thus affecting diagnostic conceptualization (Coie & Jacobs, 1993; Sroufe, 1979.)

Problematic behavior also varies by gender. Prevalence rates reveal higher ratios of males to females for a number of childhood disorders (e.g., autism is three times more likely in males than in females; Cohen et al., 1993). Sex differences can be attributed to several factors. Boys appear to be more biologically vulnerable than girls (as evidenced by higher death rates and heightened effects of malnutrition, disease, and poverty relative to girls; Birns, 1976; Eme, 1979). Alternatively, broad gender norms regarding controversial child behaviors may result in differential attention from adults. For example, adults may show less tolerance for the display of high activity levels and disruptiveness when exhibited by girls compared to boys (Chess & Thomas, 1972; Huston, 1983; Jensen et al., 1996; Lyons & Serbin, 1986). These biases may influence referrals as well as adult reporting during diagnostic data gathering. This suggests that in some cases so-called gender differences in diagnosis may be artifacts of sociocultural factors (Butcher, Narikiyo, & Bemis Vitousek, 1993; Dana, 1993; Lytton & Romeny, 1993). An understanding of gender norms and stereotypes is necessary to guard against these variables having an adverse impact on the diagnostic process.

Children within Contexts

In addition to the developmental contexts outlined previously, it is imperative that maladaptive behavior be defined and understood within the social context in which it occurs (Maccoby & Martin, 1983). Behavior in the absence of context is meaningless. Current family dynamics can exacerbate or influence problematic behavior. For example, recent changes such as the birth of a sibling, family relocation, changing schools, death of a family member or pet, or an imminent divorce can affect the child's functioning. Similarly, parental psychopathology and marital distress also have been shown to be related to child behavior problems (Campbell & Cohn, 1997; Conger, McCarty, Yang, Lahey, & Kropp, 1984; Emery, 1982; Forehand, McCombs, & Brody, 1987; Jouriles et al., 1991; Katz & Gottman, 1993; Lyons-Ruth, 1992). Although parents may not recognize the relevance of these types of events, these factors may color how the behavior of the child, specifically degree of intensity, frequency, and severity, is presented to the clinician. A child referral can be more indicative of the parents' level of functioning, ability to manage their child's behavior, or both than it is of actual child dysfunction. As such, it is important to establish early rapport with the parents and to assess the impact of current family functioning on presenting problem behavior.

Recognition of contextual factors may help determine the function of the problem behavior, increasing diagnostic accuracy. For example, inattention and oppositional behavior at home and school are symptoms seen in several childhood disorders. Defiance and inattention may be the result of poor child-management practices on the part of the parent, a consequence of excessive motor activity and deficits in attentional abilities (making it difficult for the youngster to follow instructions), a response to environmental contingencies that reward defiance over compliance (to increase peer status), or the child's tendency to avoid tasks in which they fear they might fail. Careful scrutiny of environmental contingencies may reveal different functions for these behaviors, offering important diagnostic information.

Differential diagnosis refers to the determination of which diagnosis best captures the problem behaviors the child is exhibiting. Because one purpose of diagnosis is to inform treatment, determining accurately the function of problem behavior is essential to selecting the appropriate diagnosis and intervention. Inaccuracy, especially if it goes unnoticed, ends in failure to diagnose and treat the presenting problem in an effective manner. Beyond identification of the symptom cluster of the problematic behavior, careful examination of contextual factors surrounding and maintaining problematic behavior aids the process of differential diagnosis (cf. Last & Strauss, 1990; Scotti & Morris, 2000).

DIAGNOSTIC ASSESSMENT TOOLS AND METHODS

In any evaluation, it is important that the question guide the process. There are numerous reasons children are referred for diagnostic evaluation. The presenting problem and reason for

referral form the initial evaluative framework, indicating what information is necessary, what sources are important, and what tools are appropriate to use in the collection and organization of information.

Core Components of Child Diagnostic Evaluation

The foundation of diagnostic assessment is the initial interview. During the interview, the clinician learns the difficulties the child is experiencing while establishing rapport necessary to work with the child and parents. The initial interview provides the basis for the initial case conceptualization. As information is added, the diagnostic picture takes shape. Via delineation of the problem, the clinician develops ideas regarding the nature of the dysfunction as well as preliminary diagnoses to be ruled in or out. The clinical interview also guides the selection of assessment instruments to be included.

Although unstructured clinical interviews frequently provide the basis for diagnostic decision making, the use of structured and semistructured interviews provides systematic methods that may enhance diagnostic reliability and accuracy. These devices ensure that clinicians ask the necessary questions to determine whether the child's behavior meets specific diagnostic criteria. Some examples of structured assessment instruments include the Diagnostic Interview Schedule for Children (DISC-IV) and the Child and Adolescent Psychiatric Assessment (CAPA). Semistructured interview formats include the Interview Schedule for Children and Adolescents (ISCA), the Schedule for Affective Disorders and Schizophrenia for School-Aged Children (K-SADS), and the Diagnostic Interview for Children and Adolescents (DICA). Though a thorough review of these instruments is beyond the scope of this chapter, brief descriptions of them follow.

Structured Interview Formats

The National Institute of Mental Health's (NIMH) Diagnostic Interview Schedule for Children (DISC-IV; Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000) is a reliable, highly structured diagnostic interview designed to assess more than 30 psychiatric disorders occurring in children and adolescents aged 6–17 years. The DISC-IV, widely used in clinical settings, is designed to assess for syndromes corresponding to *DSM-IV* criteria (Bravo, Ribera, & Rubio-Stipec, 2001; Garland et al., 2001; Jensen et al., 1996; Shaffer, 1994; Shaffer et al., 2000). It has undergone several revisions paralleling the revisions to both the *DSM* (i.e., *DSM-IV;* American Psychiatric Association, 1994) and the *International Classification of Diseases* (*ICD-10;* World Health Organization, 1992). It includes youth and parent forms, each using a stem-contingent question format. Informants answer all 358 stem questions; if a stem is endorsed, the informant is asked a series of contingent queries, providing additional specific information on symptomatology (frequency, severity, and duration) to be compared to *DSM-IV* criteria (Reitman, Hummel, Franz, & Gross, 1998; Shaffer et al., 2000).

The Child and Adolescent Psychiatric Assessment (CAPA; Angold et al., 1995) is a structured interview for use with children aged 9–17 years. Questions assess for symptomatology (severity, onset, and duration) in order to assign diagnoses based on *DSM-IV* and *ICD-10* criteria. The CAPA has a modular format with both parent and child forms. The CAPA may be administered in whole or in part at the interviewer's discretion. For example, if it is suspected that a youngster's problem involves a mood disorder, the clinician can administer that specific module while omitting modules associated with diagnostic categories viewed as irrelevant to the individuals (Boggs, Griffin, & Gross, 2003). The CAPA Glossary, a unique feature, provides operational definitions of terms to reduce subjectivity and confusion on the part of the clinician in administration and scoring (Angold & Costello, 2000).

Semistructured Interview Formats

The Interview Schedule for Children and Adolescents (ISCA; Kovacs, 1997) is a semistructured interview for use with children aged 8–17 years. Two versions of the schedule exist, the ISCA and the Follow-up Interview Schedule for Adults (FISA). The FISA is used in the collection of longitudinal data from adults and young adults formerly diagnosed using the ISCA (Boggs et al., 2003; Sherrill & Kovacs, 2000). The ISCA, consisting of five sections and one global assessment of functioning, queries and provides diagnoses in several *DSM-IV* categories including mood disorders, anxiety disorders, externalizing disorders, and elimination disorders. Ancillary questionnaires can be administered to assess for presence of other disorders of childhood, substance disorders, eating disorders, other anxiety disorders not addressed by the core instrument, and personality disorders (Sherrill & Kovacs, 2000). Though it offers uniform queries, there are no stem-contingent questions on the ISCA as provided by the DISC-IV (Kovacs, 1997; Sherrill & Kovacs, 2000).

The Schedule for Affective Disorders and Schizophrenia for School-Aged Children (K-SADS; Puig-Antich & Chambers, 1978), also referred to as the "Kiddie-SADS," is a semistructured interview for children aged 6–18 years. There are three modular format versions with varying foci (providing information on epidemiology in K-SADS-E, providing present and lifetime diagnoses in K-SADS-PL, and assessing present

state in K-SADS-P IVR; Ambrosini, 2000; Kaufman et al., 1997). Each form provides a psychiatric diagnosis using *DSM-IV* diagnostic criteria. The most commonly used form is the K-SADS-PL (Kaufman, Birmaher, Brent, Rao, & Ryan, 1996). Following a section to obtain information on child and family background and the presenting problem, the screen interview section is administered, which has a stem-branch format. This section is designed to obtain information on broad presenting symptomatology, thus determining which of five modules (behavioral, affective, anxiety, psychotic, and substance abuse) are to be subsequently administered. Per protocol instructions, probe questions are not required to be administered verbatim.

The Diagnostic Interview for Children and Adolescents (DICA-R; Reich & Welner, 1998) is a semistructured interview for children aged 6–17 years. Its aim is to arrive at a lifetime diagnosis within *DSM-IV* or *ICD-10* criteria (Reich, 2000) while also addressing perinatal and early development and assessing for psychosocial stressors. The format of the DICA-R requires exact wording and presentation of questions limited to specific sections of the protocol while allowing for certain deviations and specific probes for further inquiry. There are separate interview sections for parents, children, and adolescents. In addition to providing a diagnosis, the DICA-R also contains sections to assess stressors in psychosocial areas as well as perinatal and early development (Boggs et al., 2003; Reich, 2000).

Whether structured or semistructured, diagnostic interview schedules that have been subjected to empirical scrutiny offer improved evaluative reliability and validity to clinicians, enhancing diagnostic accuracy. As such, thorough knowledge of tools designed for assessment of child behavior problems allows for increased diagnostic accuracy.

Multiple Informants and Auxiliary Measures

As the diagnostic formulation gains clarity, it may be necessary to include additional sources of information or use supplementary methods. Reliance on a single source of information may lead to misdiagnosis. A comprehensive evaluation of problematic behavior (encompassing behavioral and emotional functioning) incorporates information from relevant sources, such as parents, teachers, peers, siblings, involved family members, other relevant adults, and the children themselves. Rich with contextual details, this multiinformant strategy facilitates comparisons of the child's functioning across settings.

Clinicians may choose from a multitude of assessment tools, too numerous to mention, to obtain additional information from the child and relevant other sources. Direct behavioral observation (Dadds & Sanders, 1992) and behavioral monitoring forms (Beidel, Neal, & Lederer, 1991) may provide details regarding the function of the behavior as well as help to identify relevant contextual variables. Child report measures might be used to assess broad-based functioning (YRF: Youth Report Form; Achenbach, 1991). Auxiliary measures also might be used to assess specific symptomatology such as aggression, anxiety, and inattention. Examples of these instruments include the Continuous Performance Task for impulsivity (CPT-3: Conners, 1995), Barkley's ADHD Behavior Rating Scale for attention and hyperactivity problems (Barkley, 1990), peer sociometric report for aggression (Coie, Dodge, & Copotelli, 1982), and the Childhood Anxiety Sensitivity Index (CASI: Silverman, Fleisig, Rabian, & Peterson, 1991) for anxiety. The availability of reliable and valid assessment tools that target specific problem areas provides a variety of avenues for symptom-specific data collection. Moreover, the diversity of instruments available makes easy the task of selecting an instrument that is relevant to the informant.

Diagnostic Labeling

It is also important to consider the potential impact a diagnosis can have on children and their families (Corrigan, 1998; Dickerson, 1998; Holmes & River, 1998; Lundin, 1998; Mayville & Penn, 1998). Though clinicians recognize that a diagnosis simply summarizes a symptom cluster and suggests a course of intervention, parents, teachers, and children may interpret diagnostic labels quite differently. Failure to understand the meaning of a diagnosis may have implications for how children with such problems are perceived and treated. Adults influenced by labels may assume that all children with a particular diagnosis are more alike than they actually are, leading to oversight of the child's individual needs. People, reacting to the child's diagnostic label, may notice or focus only on behavior or information that is consistent with the label. Moreover, individuals may lower their expectations for the child, believing alternative behavior to be beyond his or her capabilities. Such a response from the environment may encourage maladaptive child behavior (e.g., it may create a self-fulfilling prophecy; Rutter & Gould, 1985).

The preceding discussion highlights the importance of carefully presenting and interpreting results of a child's diagnostic evaluation to the parents. If a diagnosis is offered, care should be taken to emphasize that it is a descriptive label that summarizes the cluster of problematic behaviors rather than the cause of the problem. Etiology and prognosis, as well as typical treatments for specific dysfunction, should be conveyed clearly. With younger children, rather than present

a diagnosis, it may be most appropriate to explain the results in terms of the impact these challenging behaviors may have on the child's daily life. Potential treatment ideas also might be conveyed.

SUMMARY

The effort to define and classify abnormal behavior has an extensive history. In this chapter a brief discussion concerning the issues surrounding attempts to define normal and abnormal behavior was presented. This was followed by a brief review of the evolution of diagnostic classification of childhood psychopathology. From preliminary forms to current systems, the progression of diagnostic classification was outlined. Included was a discussion of the *DSM,* the most widely used system of psychiatric diagnostic classification. Additionally, criteria by which diagnostic systems are critiqued were discussed.

Diagnosis and classification of behavior problems is a complex process designed to delineate dysfunction or difficulties that individuals display. Myriad issues exist in diagnostic classification, some of which are unique to children. Special ethical concerns were highlighted, as were the potential negative effects of labeling. Challenges associated with diagnosing child behavior problems were also examined, such as the paucity of data on cultural and ethnic differences, the presence of diagnostic comorbidity, and the complex process of differential diagnosis. The importance of recognizing the impact of developmental, cognitive, and family variables on child functioning was also discussed. Additionally, contextual factors were also emphasized as important parts of a thorough child evaluation.

The core components of diagnostic assessment were outlined. Central to the discussion of methodology was the clinical interview. Use of clinical interview formats was recommended, and several structured and semistructured instruments were briefly reviewed. As a follow-up to the clinical interview, the use of multiple informants and supplemental assessment tools was suggested to garner information regarding specific problem areas. The importance of identifying contextual factors contributing to the problem behavior was emphasized throughout the chapter. Finally, negative implications resulting from diagnostic classification were mentioned.

Recent emphasis on developmental psychopathology (the pathways approach) has expanded understanding of how problem behavior develops and changes in children and adolescents. With this knowledge comes increased precision in diagnostic classification of maladaptive behavior via refinements and alterations to theory and practice.

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CHAPTER 2

Genetic Contributions

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INTRODUCTION

Historically, childhood disorders were thought to be the result of poor or inconsistent parenting. More recently it has been recognized that there are significant genetic contributions to many childhood disorders. It is now widely accepted that most childhood psychopathology results from complex interactions of genetic predispositions and environmental circumstances. This chapter will review the methodologies used to determine whether genetic influences impact a behavior, new developments in the kinds of questions being addressed by researchers interested in the genetics of psychopathology, and advances in our ability to detect specific genes involved in psychopathology. For illustrative purposes, many of the examples provided focus on adolescent substance use and related behavioral disorders, but the issues raised are broadly applicable to the study of other forms of behavioral and psychiatric phenotypes.

TRADITIONAL METHODS TO DETECT GENETIC INFLUENCE

Family Studies

Family studies are traditionally used as the first step in establishing whether a disorder is under a degree of genetic influence. If a certain disorder runs in families, then it is possible that the disorder is under genetic influence. If a disorder is influenced by genes, individuals who are more closely related genetically should be more likely to be affected. For example, the data shown in Figure 2.1 (Gottesman, 1991) clearly indicate that individuals who are more closely related genetically have a greater risk of schizophrenia.

However, the problem with family studies is that it is not possible to tease apart genetic and environmental influences. Individuals who are more closely related genetically (e.g., siblings as compared to cousins) are also more likely to spend more time together and share more environmental influences. Thus, genetic and environmental influences are confounded in the traditional family study. In the literature, it is not uncommon to see parent-child correlations for a particular behavior interpreted as support for the importance of environmental influences such as parenting practices. Although probably correct for some behaviors, in general, this is a faulty experimental design, in that parent-child correlations (among biological, nonadopted family members) can result from shared genes, environmental influences, gene-environment interactions, and so forth.

Adoption Studies

Another study design that has been employed to evaluate the degree to which genetic influences impact a particular behavior or disorder is the study of adopted children. When a child is adopted by individuals who are not biological relatives, it provides, in theory, a clear separation of genetic and environmental influences. These adopted children share their rearing environment with individuals with whom they share no genes, and they share genes, but not their environment, with their biological parents. Accordingly, the degree of resemblance between adopted-apart biological relatives indicates the importance of genetic influences, whereas the degree of resemblance among nonbiological adoptive relatives indicates the degree of influence of the shared environment.

A classic adoption study was conducted by Heston in the mid-1900s and had a significant impact on the way the field views the etiology of schizophrenia. A sample of nearly 50 children who were born to schizophrenic mothers between 1915 and 1945 in Oregon's state psychiatric hospitals were separated from their mothers within the first few days of life and adopted by nonschizophrenic parents. These children were followed up through age 36 and were compared to a control group of foster children whose mothers had no record of psychiatric problems, and who were matched on sex and type of placement. Of the foster-reared children of schizophrenics, 17 percent developed schizophrenia, whereas none

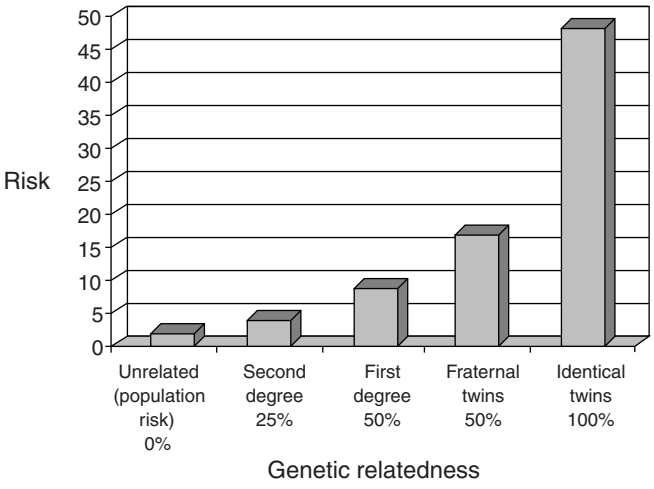

Figure 2.1 Risk of developing schizophrenia among individuals of different genetic relatedness to a schizophrenic proband (adapted from Gottesman, 1991).

of the control children did (Heston & Denney, 1967). These findings suggest that biological predispositions are involved in the development of schizophrenia, and this study helped dispel the myth of schizophrenia being caused by so-called schizophrenogenic mothers.

Another influential adoption study was Cloninger's study of alcoholism among Swedish men adopted by nonrelatives at an early age (Cloninger, Bohman, & Sigvardsson, 1981). He distinguished between two forms of alcoholism: Type 1, characterized by a later age of onset and loss of control when drinking, and Type 2, characterized by an early age of onset and high novelty seeking and antisocial behavior. Alcoholism in adoptive parents was not associated with alcoholism in their adoptive children, suggesting little role of the familial environment in causing either type of alcoholism. However, when both a genetic predisposition *and* environmental provocation were present, the risk of Type 1 alcoholism increased. In contrast, a genetic predisposition alone was sufficient to increase the risk of Type 2 alcoholism in adopted-away offspring of Type 2 alcoholics (Cloninger, 1987).

Limitations

Despite their utility in teasing apart the relative influence of genetic and environmental factors on outcome, adoption studies suffer from a number of limitations. Adoptive parents are often a biased sample of the population by virtue of adoptive agencies' screening processes. They are often higher in socioeconomic status and they have lower rates of mental illness compared to the general population. Systematic investigation of this bias has demonstrated that the restricted range of family environments observed in adoption studies can lead to substantial underestimates of the importance of the environment and upwardly biased estimates of genetic effects (Stoolmiller, 1998). Biological parents of children who are adopted away are often biased in the opposite direction, having higher rates of mental illness and a lower social standing. There are higher rates of poor prenatal care and in utero exposure to drugs, alcohol, and nicotine in adopted-away children. Another limitation of adoption studies is selective placement. If the adoptive parents are matched to the biological parents on a particular variable that influences the outcome under study, this will create an artificial inflation in the correlation between biological parents and their adopted children. For example, if the adopted family is matched to the biological parents on socioeconomic status (SES), and SES influences the behavioral trait of interest, then the estimate of heritability based on biological parent–adopted child traits will be inflated due to the selective placement. Another problem with adoption studies is that so-called open adoptions are increasingly common, in which the biological parents maintain some contact with their adopted child. This confounds the traditional separation of genetic and environmental influences that exists with the traditional adoption study. Finally, the number of children given up for adoption is decreasing, given that the stigma attached to abortion and single mothers has decreased.

Twin Studies

Twin studies are one of the most widely used methodologies to establish genetic influence on a trait of interest. Twins account for 3 percent of live births in the United States, and the rate of twinning has risen in recent years (Arias, MacDorman, Strobino, & Guyer, 2003). Monozygotic (MZ) twins (also called identical twins) result when a single fertilized egg splits during the process of cell division. It is not clear what causes this split that leads to the development of MZ twins (Hall, 2003). Because they arose from a single fertilized egg, MZ twins are identical genetically. Dizygotic (DZ) twins, also called fraternal twins, result when two separate eggs are fertilized by two sperm cells. The release of two eggs is related to increased concentration of follicle-stimulating hormone (FSH) in the mother (Hall, 2003). Dizygotic twinning is found to run in some families, likely due to genetic influence on FSH levels. In addition, FSH levels increase with age; accordingly, the chance of conceiving DZ twins increases with maternal age. Because DZ twins result from the fertilization of two eggs, they share, on average, 50 percent of their segregating genes, just as do ordinary siblings. How-

ever, unlike ordinary siblings, DZs are the same age and also share an intrauterine environment.

Comparisons of MZ and DZ twins yield estimates of the degree to which a particular behavior or disorder is influenced by genetics, the environment, or both. Traditional twin studies divide observed behavioral variance into three unobserved (latent) sources: variance attributable to genetic effects, that due to environmental influences shared by siblings (called common or shared environmental influences), and that arising in unshared environmental experience that makes siblings differ from one another (called unique environmental influence). Variance attributed to genetic effects can be further divided into additive genetic influences and dominant genetic influences. Except for the sex chromosomes, individuals have two copies (called alleles) at any given genetic locus, one inherited from each parent. Under an additive system, each copy contributes additively to the outcome, so individuals with one copy of the genetic variant have a phenotype intermediate to individuals with zero copies and individuals with two copies. When there is dominance, only one copy is necessary for the effect on the outcome; individuals with one or two copies look equivalent to each other and different from individuals with no copies. It is not possible to estimate both dominant genetic influences and common environment at the same time when only twin data are available.

Because MZs share more of their segregating genes than do DZs, but both types of twins, when raised together, share their home environment, increased similarity among MZs is interpreted as evidence for genetic effects. As an example, consider a behavior on which MZ twins correlate at 0.8 and DZ twins correlate at 0.5. The fact that MZs are more alike than DZs are would suggest genetic influence on this behavior. More specifically, we can get a rough estimate of the degree to which genes influence the behavior by doubling the difference between MZs and DZs [$2 \times (0.8 - 0.5) = 0.6$]. Accordingly, the amount of variance that would be attributed to additive genetic effects (A) for this behavior would be 60 percent. This estimate is called a heritability estimate. It indicates the proportion of variance that can be attributed to genetic variance out of the total variance in the behavior. One can imagine that if the correlation between MZs and DZs is identical, the heritability would be 0, and there would be no evidence that genes influence this behavior. Heritability estimates are specific to a particular population at the particular point in time at which it was studied. (More details about this are included later in the chapter.) Common environmental influences (C) are those that make siblings more similar to one another. These could include a shared home environment and parental rearing practices; shared peers; and shared societal factors, such as religion or a shared school. Common environmental influences are suggested when the DZ correlation is greater than half the MZ correlation, because half the MZ correlation is the degree of similarity expected based on genetic influences alone. When DZ twins are more alike than what is expected based on their degree of genetic similarity, it suggests that common environmental influences are acting on the trait. When the correlation for DZ twins is less than half that of MZ twins, it suggests dominant genetic effects (D). As previously mentioned, C and D effects cannot be estimated simultaneously; however, the ratio of the DZ correlation to the MZ correlation can be used to determine whether a model testing C effects or D effects is more appropriate. Finally, unique environmental effects (E) are influences that make siblings dissimilar to one another. These can include influences such as different peers or differential parental treatment of the twins. E effects also include the so-called slings and arrows of outrageous fortune, that is, unexpected environmental effects that impact a single individual. E effects are suggested when the MZ correlation is less than 1. In the case of our hypothetical behavioral example, an MZ correlation of 0.8 would suggest that (1.0–0.8) 20 percent of the variance is due to unique environmental effects. Error is also included in the E term. If a behavior is under only genetic influence, MZ twins should be identical for the behavior. The fact that MZ twins are not perfectly correlated for most behaviors of interest suggests that unique environmental effects play a role, there is error in our measurement of the phenotype, or both. Monozygotic twins cannot be any more correlated than the same individual assessed at two time points. Some genetically informative models have attempted to take into account reliability of the measurement (Kendler, Neale, Kessler, Heath, & Eaves, 1993).

Limitations

Twin studies make certain assumptions in order to draw conclusions about the relative importance of genetic and environmental effects. The primary assumption of the twin design is the equal environments assumption. In the classic twin design, any excess similarity in MZ twins, relative to DZ twins, is attributed to genetic influence. If identical twins are treated more similarly than fraternal twins, they may be more alike for reasons other than their additional shared genes. For example, if physical similarity influences social treatment, which subsequently influences psychiatric outcome, then MZ twins would be more similar than DZs, in part for nongenetic reasons. Twin researchers have used a number of methods to test the equal environments assumption. In one study, researchers made home visits to evaluate similarities in the ways parents treated MZ and DZ twins. Any excess similarity

in the treatment of MZs was found to be caused by parental responses to the children's behavior (which was presumably more similar in MZs to the extent that genetic influences impact behavior) (Lytton, 1977). There is no question that MZ twins have increased shared experience; MZ twins report more frequently sharing the same room and being dressed alike as children, and parents report treating their MZ twins more similarly. The issue is whether this type of shared experience influences the trait or disorder of interest. Most studies have found no correlation between the report of these types of environmental experiences and similarity for personality, intelligence, and most psychiatric disorders. Finally, a number of twins and parents are misinformed about the twins' zygosity. If expectations about MZ twins lead to greater similarity in parental treatment and outcome, we would expect DZ twins misclassified as MZs to be more similar than DZ twins correctly classified. For a variety of traits, there has been no evidence that perceived zygosity influences outcome. Thus, the majority of studies that have tested the equal environment assumption have found that it is correct for most behavioral outcomes of interest, such as personality and psychopathology. Minimally, it appears that the equal environment assumption does not contribute any substantial bias to the conclusions of twin studies (Cronk et al., 2002).

In addition, twin studies have been criticized because twins differ from singletons with respect to their prenatal and perinatal development. Twins are more likely to have a lower birth weight, and they are more likely to experience congenital abnormalities. To the extent that birth weight and prenatal development may influence the outcome under study, twins may not be representative of the risk factors that most individuals experience. However, no excess in rates of psychopathology has been found in twins (Kendler, 1993).

THE EVOLVING FIELD OF BEHAVIOR GENETICS

Historically, the field of behavior genetics had a single and simple goal: to demonstrate that some of the variation in behavior is attributable to genetic variance. This may seem to be a simple idea, but it was met with much resistance at the time it was put forth, as the predominant view was that psychopathology was the result of abnormal childhood development. Now, less than 50 years after the first text on behavior genetics was published (Fuller & Thompson, 1960), a diverse array of behaviors has been investigated with twin and adoption designs, yielding evidence that genetic variation contributes to individual differences in virtually all behavioral domains (McGuffin, Riley, & Plomin, 2001). The questions addressed by researchers interested in the genetics of both normal and abnormal behavior are now increasingly complex. Several factors have contributed to this advance. One of these developments has been the establishment of population-based twin registries. Early studies often used small sample sizes and clinically ascertained twins. This limited the conclusions one could draw, in that individuals who seek treatment for their disorder may not be representative of the majority of affected individuals. Additionally, the presence of multiple psychiatric problems also influences treatment seeking. Population-based twin registries allow one to make population estimates, to study both normal and abnormal phenotypes, and to study large numbers of twins. Several population-based twin registries have been established in the United States, such as one in Virginia using driver's license records (Kendler, Neale, Kessler, Heath, & Eaves, 1992) and one in Missouri using birth records (Kendler et al., 1992; Todd et al., 2001). In addition, some of the most famous population-based twin registries have been established in European countries, in which central population registries have allowed investigators access to birth records and current addresses for the country's residents (Boomsma, 1998; Kaprio, Pulkkinen, & Rose, 2002). Population-based twin registries have also made it possible to ascertain and prospectively study large samples of twins, necessary for the complex models now being applied to twin data.

The application of biometrical modeling to twin data is a second advance that has drastically expanded the type and complexity of questions that can be addressed regarding the genetics of behavior. Model fitting allows one to statistically specify a hypothesis and then test the fit of the data to that hypothesis. Competing hypotheses can also be specified and statistically tested. In addition, model fitting allows for more accurate parameter estimates and for confidence intervals to be obtained for those estimates. Detailed in the following sections are several of the more complex kinds of questions, regarding *how* genetic influences impact a particular trait, that can now be addressed through biometrical modeling of twin data.

Developmental Changes

We know that the impact of genes is not static, but rather that the importance of genetic factors can vary across development. Such changes can be dramatic and rapid, particularly across childhood and adolescence. For example, in a sample of adolescent Finnish twins assessed on three occasions from ages 16 to 18.5, genetic contributions to individual differences in drinking frequency increased over time, accounting for only a third of the variation at age 16 but half of it just 30 months later (Rose, Dick, Viken, & Kaprio, 2001). Con-

currently, the effects of sharing a common environment decreased in importance. Analyses of another sample of Finnish twins, assessed for the initiation of alcohol use by age 14, found that even earlier in adolescence the effect of genes on drinking patterns was negligible, accounting for only 18 percent of the variation among drinking initiation in girls and having no significant effect yet at this age in boys (Rose, Dick, Viken, Pulkkinen, & Kaprio, 2001).

Dramatic changes in the heritability of IQ across development have also been documented. Developmental comparisons have demonstrated that, for general cognitive ability, heritability increases from infancy (about 20 percent) to childhood (40 percent) to adolescence (50 percent) to adulthood (60 percent; McGue, Bouchard, Iacono, & Lykken, 1993), a finding that has been extended into twins aged 80 years or older (McClearn et al., 1997). Interestingly, analyses of smoking frequency in the same population of Finnish twins described previously found little change in the importance of genetic and environmental effects across ages 16–18.5, illustrating the trait specificity of gene-environment dynamics: some effects are stable across a developmental period, whereas others change.

Gene-Environment Interaction

Standard twin models yield estimates of the amount of variance attributable to genetic and environmental effects for a given population. These models average across any group differences that may exist in the population. As an overly simplistic example, a heritability of 50 percent could mean that for half of the population studied the trait is completely determined by genetic influences, and for the other half, the trait is completely determined by environmental influences. Additionally, if not explicitly modeled, gene-environment interaction effects could be subsumed under estimates of genetic influence (Heath, 2003). Therefore, a more sophisticated understanding of the etiology of any particular trait should provide insight into how genetic influences act within the context of particular environments (McClearn, 2004).

Early documentation of the potential importance of gene-environment interaction on behavioral outcome was found in data from the Australian twin registry: marital status moderated the relative importance of genetic effects on alcohol consumption (Heath, Jardine, & Martin, 1989) and on depression symptoms (Heath, Eaves, & Martin, 1998) in females. Having a marriagelike relationship reduced the impact of genetic influences on drinking. A marriagelike relationship also reduced the influence of genetic liability to depression symptoms: genetic factors accounted for far less of the variance in depression scores among married women, as compared to unmarried females (Heath et al., 1998). This study illustrated that environments can moderate the impact of genetic and environmental influences on behavior and suggested that a protective environment, characterized by a marriagelike relationship, may reduce the impact of genetic predispositions to various clinical problems.

Interestingly, there is reason to believe that genetic influences on adolescent behavior may be particularly susceptible to moderation by environmental effects. Adolescent substance use provides an illustrative example. Because substance use is illegal for most adolescents, exposure to particular environments allowing access to the substance are necessary before individuals have the opportunity to express genetic predispositions for patterns of use and abuse. Thus, genetic influences on adolescent substance use may be particularly dependent on the environmental context. As an illustration, in results from the Minnesota Twin Family Study, boys who had inherited a high genetic risk (based on their parents' alcohol use) were at increased risk of developing substance use by age 14 if they were exposed to a high-risk environment, such as deviant peers. However, genetic risk was largely irrelevant among boys whose environment was characterized as low risk (positive peer influences, a positive relationship with the mother, and participation in religious and school activities; Legrand, McGue, & Iacono, 1999).

In data from the Finnish Twin Studies, we have also found evidence of a strong moderating effect of the community environment on adolescent alcohol use. At age 16, we found that genetic influences accounted for nearly two times as much variance in drinking frequency in urban environments as compared to rural environments. Conversely, common environmental effects played a larger role in rural settings (Rose, Dick, Viken, & Kaprio, 2001). Further exploration of this effect illustrated that this moderation was dramatically enhanced when we incorporated more detailed information about specific aspects of the adolescent's community. For example, in neighborhoods with low stability (high rates of migration in and out), genetic influences accounted for more than 60 percent of the variation in drinking patterns, and common environmental effects played no detectable role. However, in neighborhoods with the most stability, common environmental factors played the largest role, accounting for nearly 50 percent of the variance, while genetic factors accounted for only 20 percent. These results suggest that communities characterized by greater social mobility allow for increased expression of genetic dispositions that contribute to individual differences in adolescent drinking. Conversely, communities with more social structure create opportunities in which common environmental effects assume greater importance, presumably by engendering more accountability for