Research on Children & Adolescents with Mental, Behavioral & Developmental Disorders

Institute of Medicine

RESEARCH ON CHILDREN AND ADOLESCENTS WITH MENTAL, BEHAVIORAL, AND DEVELOPMENTAL DISORDERS:

Mobilizing a National Initiative

Report of a Study by a Committee of the

INSTITUTE OF MEDICINE

Division of Mental Health and Behavioral Medicine

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This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

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PREFACE

In July, 1988, at the request of the Director of the National Institute of Mental Health (NIMH), the Institute of Medicine (IOM) appointed a committee to study the current status of research on child and adolescent mental disorders. The impetus for this study grew out of a series of communications, spanning several years, between the IOM's Board on Mental Health and Behavioral Medicine and officials of NIMH concerning the importance of this area of inquiry, the opportunities for significant research advances in the field, the limited amount of funding currently available to support research, and the shortage of investigators committed to the field.

The commissioning of this study is also an outgrowth of an earlier activity by the IOM Board leading to its 1985 report, Research on Mental Illness and Addictive Disorders: Progress and Prospects.* That report documented the enormous societal burden that mental disorders, alcoholism, and drug addictions impose, the substantial progress made recently in understanding and treating them, and the striking discrepancy between research opportunities and the level of federal investment in research. Coming at a propitious time, the report helped coalesce a number of efforts to strengthen the research endeavors in the Alcohol, Drug Abuse and Mental Health Administration (ADAMHA).

The Board has continued to monitor informally the degree to which specific recommendations in its report were implemented. One of its key conclusions was that there was an especially conspicuous need for increased support for research related to mental disorders of infancy, childhood, and adolescence. The Board's interest in this area led the IOM Program Committee and Council in 1987 to emphasize the importance of "efforts to establish conditions for fostering productive research, particularly the training of clinician researchers and researchers in child mental health."

In commissioning the current report, the Director of NIMH encouraged the committee to engage in a broad exploration of research on child and adolescent mental disorders. The committee was asked to provide illustrations of recent progress and to identify promising research opportunities. It was also mandated to review the policies and programs of NIMH in this area, to make explicit recommendations concerning how NIMH might engage in capacity-building for the development of a well-trained cadre of researchers, and to delineate

* Institute of Medicine. (1985). Research on mental illness and addictive disorders: Progress and prospects. American Journal of Psychiatry, 142 (7, Suppl.), 1-41.

what resources would be needed to achieve sustained scientific progress. Because he wished to move ahead promptly with planning in this area, the Director asked the IOM to do this study on an abbreviated schedule and to provide an interim report eight months after inception of the study.

The steering committee for this study was appointed in July, 1988. As is the custom for Institute of Medicine studies, the committee members came from a wide and diverse range of relevant disciplines and viewpoints. Among the committee members were basic and clinical researchers from child psychiatry, pediatrics, psychology, social work, developmental neurosciences, genetics, and epidemiology. The committee further broadened its perspective in several ways. First, it appointed several task forces (whose members are listed in the Appendix) to augment its deliberations by preparing materials on key areas of concern. Second, it interviewed NIMH research and administrative personnel on several occasions, including a day-long site visit. Third, with the help of the IOM staff, it sent specific questions about research opportunities and barriers to a large number of individuals and organizations that are active or interested in child and adolescent mental disorders.

The committee received nearly 100 written and oral responses from scholars and investigators in the field, representatives of major national professional organizations, chairpersons of departments of psychiatry and psychology, officers of private foundations that support research in this area, and public organizations and coalitions with an interest in mental health and child issues. These perspectives provided a rich and invigorating view of the child mental health field.

A great many people made essential contributions to the work of the committee and its task forces. A number of these individuals are mentioned in the Acknowledgments. However, the success of this project depended ultimately on the capabilities and efforts of the Institute of Medicine staff. We are grateful to Dr. Samuel Thier, President of the Institute of Medicine, for his personal support and encouragement for this unusually fast-paced project. The study was supervised from its inception to its conclusion by Dr. Fred Solomon, Director of the Division of Mental Health and Behavioral Medicine and staff Director for the Board on Mental Health and Behavioral Medicine. The study director, Dr. Cleopatra Howard Caldwell, provided superb day-to-day organization of this complex activity. She was ably and tirelessly supported by Ms. Brenda Rohren, who served as research associate, and by Ms. Elizabeth Kitsinger, who produced the many draft manuscripts that eventually became this final report.

James F. Leckman, Chair
Glen R. Elliott, Vice-chair

CONTENTS

SUMMARY

One-quarter of the U.S. population is under age 18, and at least 12 percent of these children have a diagnosable mental illness. This report focuses on those 7.5 million children and on the field of child mental health, which examines the emotional, behavioral, and developmental disorders of this age group. It documents the progress being made in understanding, preventing, and treating such disorders, highlights some of the many promising opportunities for future research, and delineates critical resource requirements for advancing the field.

BACKGROUND AND PROCEDURE

The study was undertaken at the request of the Director of the National Institute of Mental Health (NIMH). Both the NIMH and the Institute of Medicine's Board on Mental Health and Behavioral Medicine have been concerned about the severe limitations in personnel and other resources necessary not only to provide clinical services to children, but especially to provide the essential research base required to ensure continued progress in the understanding and treatment of childhood mental disorders. The Director of NIMH asked the Institute of Medicine to establish a committee to:

1. appraise current knowledge and areas of recent research progress concerning children with persistent and disabling mental disorders;

2. identify promising research opportunities arising from advances in related fields;

3. identify areas of high research priority;

4. consider unique challenges to researchers in this field; and

5. render a "capacity-building" plan for the development of personnel and resources needed to ensure a cadre of researchers in the future, including an estimate of funding levels for areas of research, training mechanisms, and career development opportunities at NIMH.

The NIMH Director asked the committee to focus on research relating primarily to diagnosable mental disorders, rather than on broader indicators of social dysfunction. Therefore, this report deals with phenomena such as drug abuse, teen pregnancy, and school drop-out mainly as consequences of or risk factors for developing mental disorders.

The work of the committee was augmented by the activities of five task forces. Each was chaired by a member of the steering committee and included additional scholars from diverse disciplines within the field of child mental health. Four of the task forces were organized around substantive research issues: classification, assessment, and epidemiology; causes and determinants of childhood mental disorders; treatment and preventive interventions; and intrinsic challenges to researchers. The task force on manpower and institutional supports was responsible for assessing personnel and funding needs related to research career development and stabilization in this area.

The committee also consulted with other experts in the field, including investigators currently engaged in basic and clinical research with children, chairpersons of departments of psychiatry and psychology, private foundations that support research in this area, and advocacy groups concerned with children's issues. Research and administrative personnel at NIMH were interviewed on several occasions to determine current agency policies and procedures as well as funding of research, research training, and career development related to child mental health.

Although the committee made a great effort to gather information from a number of experts, the conclusions and recommendations in this report represent a consensus of the committee itself. The report is not meant to be comprehensive, but rather to highlight some of the areas of childhood mental disorders in which significant research progress has been made and to delineate prerequisites for future advances.

RESEARCH PROGRESS AND PROMISING OPPORTUNITIES

The committee discovered a consistent pattern of both frustration and optimism among investigators in the many and diverse disciplines that constitute the child mental health research field. Whatever the specialty, distressingly few research centers in the United States focus explicitly on severe mental disorders of children and adolescents. However, some such centers do exist, and others are struggling to establish themselves. Furthermore, numerous individuals are working alone or in small groups to advance important aspects of research on these disorders. Their progress has been heartening.

Uncertainties still exist about what constitutes mental illness in children and how common these disorders are. Even so, marked progress is being made in developing objective, reliable methods of defining and identifying such disorders. The committee believes that significant progress is possible over the next few years in enhancing the precision and usefulness of diagnoses of childhood mental disorders, in identifying who is afflicted, and in assessing what kind of mental health services they receive and require, how they are being

served, and at what cost. Also important are studies of how best to integrate findings about a child's ability to provide diagnostic information and how best to incorporate information from other informants such as parents, teachers, and clinical interviewers.

Because the child is a developing organism, prospective longitudinal studies are likely to be crucial. Such studies enable investigators to clarify connections between preclinical symptoms and subsequent disorders, between identifiable risk factors and subsequent difficulties, and between biological and psychological or social influences on the disease process.

The committee found that the child mental health field is increasingly committed to the formidable task of addressing the complexities inherent in unraveling the causes and determinants of childhood mental disorders. Over the past several decades, investigators have garnered convincing evidence that a variety of biological, psychological, social, and environmental factors are implicated as causal agents in specific mental disorders. For example, genetic factors have been implicated in vulnerability to several disorders, such as Tourette's disorder, autism, and certain learning disabilities; biological insults, such as physical injury or exposure to toxins, may put children at risk for a number of behavioral disorders; and persistent psychosocial adversity, such as poverty, overt abuse or neglect, or disturbed family relationships, is known to increase the risk of mental illness in children. Although the connections between child mental disorders and factors such as these are increasingly accepted, much less is known about the underlying mechanisms.

Advances in research technologies in the neurosciences and in the psychological and social sciences make such research far more feasible. For instance, it is now possible to study safely, in living children, aspects of brain architecture, components of brain electrical activity and metabolism, and even some substances known to be important in brain function. The extraordinary progress in human genetics holds promise that those mental disorders of childhood with a relatively simple genetic component soon may become amenable to study. Once an individual at risk for a specific mental disorder can be defined on the basis of a precise genetic marker, scientists will be able to initiate a panoply of ground-breaking studies. These would include efforts to define the precise biological mechanisms involved and careful studies of psychological and social factors that mitigate or exacerbate vulnerability to the disorder.

Similarly, psychological and social scientists have made great strides in refining techniques for assessing cognitive function, individual and interpersonal behaviors, and even central elements of environmental influences. Instruments are being developed that will permit future studies to be more sensitive to multiple dimensions of

child behavior, such as competencies versus disabilities; various communicative and social skills; and motivation, resilience, and adaptive functioning. These instruments will make it possible to do the sophisticated studies that are still needed of social and environmental factors, family interactions, and community resources and their utilization as these topics relate to childhood mental disorders.

Finally, there is increasing reason for optimism that many of the major childhood mental disorders are responsive to treatment. Too often, available interventions can only reduce the level of disability rather than treat the underlying disorder; even so, such interventions can be of enormous benefit. Existing treatments are diverse and can occur at many levels. Individual interventions include behavior therapy, dynamic therapy, group therapy, and drug therapies. Other treatments are aimed at the family, such as parent training or family therapy, or at other settings, including schools, communities, or legal systems. Also crucial and in special need of facilitation is careful research on preventing mental disorders through early interventions in populations at risk.

The proliferation of approaches makes it imperative that researchers assess which treatments are most effective in which settings, examine possible useful combinations of treatments for particular mental disorders, and explore how treatments can be applied most cost-effectively in various settings.

OVERCOMING BARRIERS TO RESEARCH

The committee found numerous intrinsic and extrinsic barriers that researchers must overcome to study childhood mental disorders. Intrinsic obstacles arise from the complex nature of normal human development and the ethical and pragmatic issues raised by research with infants and young children. Extrinsic barriers include the shortage of well-trained investigators, the paucity of institutional settings for child mental health research, and the lack of sustained funding for researchers.

There is a continued, pervasive perception of childhood mental disorders as being too intractable to serve as appropriate targets for research. Furthermore, persons who are drawn to the problems of the young mentally ill often find it far easier to receive training in clinical care than to obtain needed research skills. The committee believes that the perception of futility is inconsistent with the readily demonstrable progress in the field and with the plentiful opportunities that exist in child mental health research. Child mental health researchers--wherever they are located--must take responsibility for promulgating a more optimistic perception of their field. Rapid, sustained improvements in research on child mental

disorders, however, hinge not only on changed perceptions, but also on the creation of adequate incentives and financial support for a vigorous expansion of child mental health research.

A NATIONAL PLAN FOR NIMH-SPONSORED CHILD AND ADOLESCENT MENTAL DISORDERS RESEARCH

Although several federal agencies support research on the emotional and developmental difficulties of children, NIMH is the agency primarily responsible for fostering research and research training on mental health issues. For more than 20 years, the specific mental health concerns of children and adolescents have been described as a high priority at NIMH. Yet, it has not been as visible a leader in relation to child and adolescent mental disorders as it has been in relation to adult mental disorders. After reviewing NIMH's current programs relevant to childhood disorders, the committee concluded that NIMH can fulfill its leadership role in this area by implementing a comprehensive plan to support and stimulate growth in the field of child mental health research.

The national plan recommended by the committee focuses on three interrelated areas: developing viable careers in child mental health research; encouraging and supporting programmatic research at the frontiers of scientific inquiry; and enhancing NIMH's ability to provide sustained leadership in this area. This capacity-building plan will set the stage for a major expansion of this field of scientific inquiry. Four major recommendations serve as the cornerstones of the proposed national plan:

1. NIMH should provide support and incentives at each stage of career development, including research training and career stability for an expanded pool of research scientists.

2. NIMH should increase support for individual project, program project, and center grants.

3. NIMH should increase funding for research in the areas of epidemiology; assessment, diagnosis, and treatment; prevention and special populations; services and systems of care; basic behavioral and social sciences; neurosciences; and the NIMH intramural research program.

4. NIMH should establish an institute-wide consortium concerned with child and adolescent mental health research to implement this national plan.

Recommended Budget

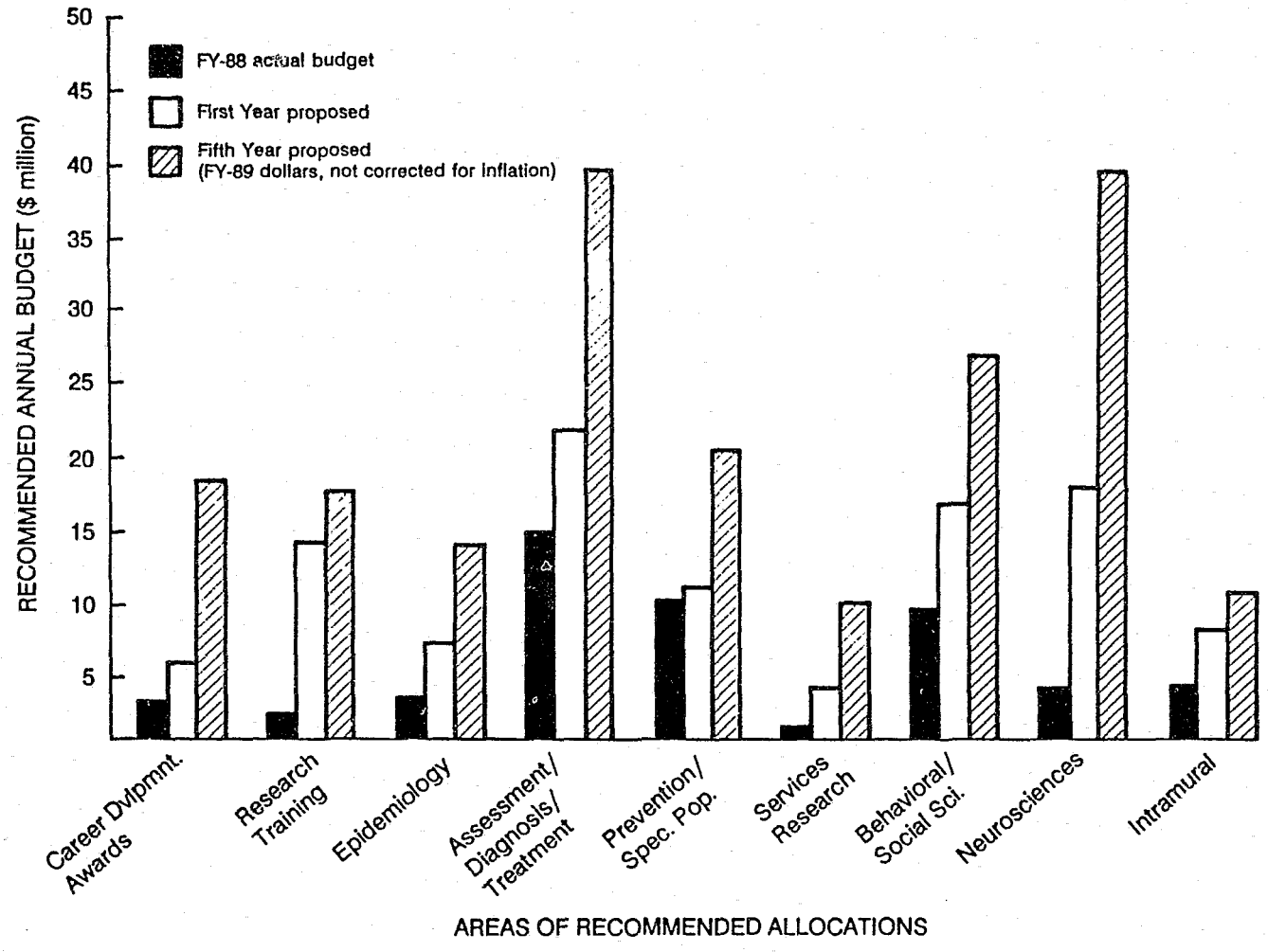
The committee was not asked to prioritize the child mental health budget in relation to other areas of responsibility within the purview of NIMH. However, the committee has made a number of recommendations to NIMH for the allocation of funds for career development, research training, and research in response to the request to describe the resources necessary for a national research initiative for child mental disorders. Figure S-1 summarizes current and proposed funding for Years 1 and 5 of this national plan in constant 1989 dollars. The committee proposes a phasing-in of expenditures, with an initial surge of support to meet the most pressing needs in the field. The emphasis in the first year would be on taking advantage of missed research opportunities in the child mental health field due to lack of funding, on building the infrastructure necessary for growth, and especially on supporting research training and career development to ensure a cadre of researchers in the future.

As part of the national plan, both viable academic research careers in child mental health and training opportunities for such careers need to be created. A delicate balance exists between creating new career pathways and training individuals to follow them. Future progress in research on child and adolescent mental disorders is dependent on the recruitment, training, and retention of gifted scientists across a range of disciplines. The committee believes, based on its assessment of available data, that current training programs do not meet the serious need for more child mental health researchers.

Career Development

In the judgment of the committee, the single most pressing need is for NIMH to support well-trained, highly motivated scientists during the first decade of their research careers. Although several programs for fostering early research experiences and promoting excellence currently exist at NIMH, these programs are underfunded. Furthermore, the committee heard repeatedly from researchers throughout the country and across all disciplines that the current ceilings on stipends create serious problems.

Key ingredients for success, besides the motivation and capability of the individual, are having sufficient time to develop an independent line of research and having access to necessary resources, including colleagues from related fields. The committee believes such protection and resources are especially critical for new investigators faced with conflicting demands on their time. One of the strengths of the NIMH career development awards is the requirement that investigators be guaranteed substantial amounts of protected time for research. In an effort to take advantage of the benefits of these


RECOMMENDED ANNUAL BUDGET ($ million)
50
45
40
35
30
25
20
15
10
5
FY-88 actual budget
First Year proposed
Fifth Year proposed
(FY-89 dollars, not corrected for inflation)
Career Dvlpmnt. Awards
Research Training
Epidemiology
Assessment/ Diagnosis/ Treatment
Prevention/ Spec. Pop.
Services Research
Behavioral/ Social Sci.
Neurosciences
Intramural
AREAS OF RECOMMENDED ALLOCATIONS

existing mechanisms, the committee recommends that existing scientist development awards be increased so that salaries for investigators are no less than 80 percent of the customary salaries of beginning or middle-level faculty and that the number of awards for child mental disorders researchers should be doubled immediately.

The 1988 budget for NIMH career development awards--including Individual Awards, FIRST Awards and Small Grant Awards--was $2.7 million. The recommended increase for the first year of this plan is $3.3 million, for a first year total of $6 million, supporting 70 grants. By Year 5, the recommended cost of the career development program should be $18 million, supporting 210 grants.

Research Training

The committee found that expanded opportunities for research training are necessary in all disciplines involved in the study of child and adolescent mental disorders, especially in child psychiatry, clinical and developmental psychology, pediatrics, developmental neuroscience, nursing, and social work. For example, there are very few academic child psychiatrists in the United States who are able to sustain a major research commitment. Multiple teaching, clinical, and administrative demands are made on these individuals, with the result that fewer than 100 academic child psychiatrists are currently devoting 30 percent or more of their time to research; fewer than 20 can be considered full-time investigators, spending 80 percent or more of their time doing research. In the area of social work fewer than 300 doctoral degrees are awarded annually, and only a small fraction of these focus on research topics related to childhood mental disorders. Approximately 1,500 clinical, counseling, and school psychologists and about 200 developmental psychologists receive Ph.D. degrees annually, and many of them receive research training as a part of their doctoral programs. However, the actual number of psychologists who pursue careers in basic or clinical research related to childhood mental disorders is disappointing, considering the large pool of potential researchers trained each year.

Other disciplines that have much to contribute to the understanding of the causes, treatment, and prevention of mental disorders in infants, children, and adolescents are in need of expanded opportunities for research training as well. A variety of approaches should be considered for training researchers from various disciplines. These include undergraduate summer research programs, pre- and postdoctoral programs, M.D.-Ph.D. training programs, and special training opportunities for members of minority groups. In some disciplines, the most efficient mechanisms will be institutional grants for research training programs; in others, individual grants could enable a trainee to focus on child mental disorders while pursuing a more general training program in neuroscience,

epidemiology, or some other relevant discipline. Some training programs may appropriately be incorporated into research centers.

In order to achieve growth in this field, the pool of potential trainees must be expanded. Attracting more talented students is not simply a matter of money. Means must be found to acquaint a broader audience of students with the importance of child mental disorders, the burden of illness they impose, the urgent need for progress, and the exciting potential for scientific advances, particularly at the interface between disciplines. The committee recommends that NIMH target two points in an individual's career: the final two years of undergraduate education, and the completion of graduate or professional training. NIMH should also consider establishing a program for senior scientists that would include an explicit research training function.

In 1988, NIMH spent $2.1 million for research training related to children and adolescents through support for institutional training grants and individual fellowships. The committee proposes a first-year budget of $14 million for these grants, which also includes an emphasis on support of M.D.-Ph.D. students. By the fifth year, the budget for research training should increase to $17.5 million.

NIMH Research Areas

The committee reviewed each of the following funding mechanisms in considering the best way to fund priority areas of research at NIMH: individual project grants, program project grants, multisite collaborative studies, and research center awards. It concluded that individual project grants need to be expanded in order to sustain and fully utilize the nation's existing research capacity. The committee believes, however, that program project grants and research center awards are also needed to move research ahead rapidly. In general, the committee strongly recommends that, where appropriate, grants be funded for five years, with special attention given to creating stable mechanisms to support longitudinal studies that may continue over even longer periods.

Several NIMH research program areas relevant for childhood mental disorders research were reviewed during the course of this study: epidemiology; assessment, diagnosis, and treatment; prevention and special populations; services research; behavioral and social sciences; developmental neurosciences; and the intramural research program. Each area has a contribution to make to the understanding of the causes and treatment of childhood mental disorders. Proposed allocations for each area represent the consensus of the committee and are based on information from researchers about existing and potential efforts and on data from NIMH about the shortfall of current resources in each area to fund worthy proposals. The heavy allocation of

resources for some areas in the first year reflects the committee's belief that these areas are capable of immediate, marked growth; for others, efforts are needed to stimulate greater interest and to enhance the infrastructure for research capability. Table S-1 shows the first- and fifth-year proposed costs for each research area.

TABLE S-1: Recommended NIMH Research Budget

Program	Current ($ millions)	First Year ($ millions)	Fifth Year ($ millions)
Epidemiology	3.2	7.5	14.0
Assessment, diagnosis and treatment	15.0	22.0	40.0
Prevention and special populations	9.4	13.0	20.5
Services and systems of care	1.0	4.0	10.0
Behavioral and social sciences	10.0	17.0	27.0
Developmental neurosciences	4.3	18.0	40.0
NIMH intramural program	4.5	8.5	10.5
TOTAL:	47.4	90.0	162.0

The committee also recommends the establishment of an institute-wide consortium to coordinate the research programs related to children across NIMH. This consortium should seek a leadership role in advocating child mental health research among the other federal agencies that are at least partially concerned with the health of the nation's children. Given the need for capacity building, innovative review procedures may be desirable. This is an issue that this consortium should address immediately. The committee found that there is an acute need for review by knowledgeable peers. Since the current review process for grants on children is widely dispersed,

with as many as 11 of the 20 initial review committees involved, there may be a need to establish one or two research review committees focusing explicitly on child mental health.

If NIMH is to foster a rapid increase in research within the field of child mental health, adequate attention must be paid to its personnel needs. The committee estimates that initially $1 million per year would be needed to support the administrative personnel necessary to implement the research initiative.

CONCLUSIONS

The committee shares with others in the field an excitement about the demonstrable progress occuring in many segments of child mental health research. Furthermore, it was impressed that advances in the field and in related specialties hold promise of even more impressive gains in the near future. The nation would do well to capitalize on the momentum that has developed in the past two decades.

The committee has called for a broad initiative that would promote research simultaneously in many areas of child mental health. It has done so in the belief that no single approach or small group of studies can claim preeminence. Rather, the field as a whole can and must move forward, with explicit attention to possible synergisms among disciplines, both basic and applied. When implemented, this national plan for child mental disorders research will reap benefits for the children who are afflicted, for their families and friends, and for society as a whole.

CHAPTER 1

INTRODUCTION AND OVERVIEW

In the normal child, the vast array of genetic, neurochemical, physiological, psychological, interpersonal, and social processes of development follow a well-orchestrated course that transforms the curious infant into a competent adult. But in some less fortunate children, development has gone awry. This report is about such children.

Mental, behavioral, and developmental disorders occur in every socioeconomic, racial, and cultural group in the world. In this country, at least 12 percent (or about 7.5 million) of the 63 million children under age 18 suffer from one or more mental disorders (Gould, Wunsch-Hitzig, and Dohrenwend, 1981). A great deal is known about the types of conditions from which children suffer, how these conditions change over time, and some of the factors that predispose a child to mental illness. For the preponderance of mental disorders of childhood, however, the causes are unknown, as are the factors that make one child especially susceptible and another child resistant.

The Director of the National Institute of Mental Health (NIMH) asked the Institute of Medicine (IOM) to assess the status of research on child mental disorders. The study was to: (1) highlight the current state of knowledge and significant areas of recent progress, (2) identify areas of high research priority, (3) emphasize promising opportunities for research arising from advances in related fields, and (4) consider unique or intrinsic challenges to research that complicate studies of these disorders. The Director also sought a review of the policies and programs of NIMH, with specific recommendations about how the institute might provide vigorous leadership in clinical and basic research related to mental disorders of children. He asked for a speedy response so that he might begin his own planning in this area as quickly as possible.

The Director of NIMH asked the IOM study committee to focus its attention primarily on diagnosable mental disorders, rather than on broader indicators of social dysfunction. Consequently, the scope of this study includes the range of mental disorders contained in classification systems such as the Diagnostic and Statistical Manual of the American Psychiatric Association (DSM-III-R; 1987) and the International Classification of Diseases of the World Health Organization (ICD-9; 1978). Phenomena such as drug abuse, teen pregnancy, and school drop-out are discussed mainly as consequences of or risk factors for the development of mental disorders.

In the DSM-III-R, a mental disorder is conceptualized as "a clinically significant behavioral or psychological syndrome...that is associated with present distress (a painful symptom) or disability (impairment in one or more important areas of functioning) or with a significantly increased risk of suffering death, pain, disability, or an important loss of freedom" (American Psychiatric Association, 1987, p. 401). The committee has chosen primarily to use the phrases "mental disorders" and "mental health research," but it uses other terms as well and hopes that the context will make the intent clear.[1] The term "mental disorders" is not wholly satisfactory, however, because it suggests a pathological process arising in isolation within the child. This may distort our view of the child as a person with specific strengths and weaknesses, who grows up in the midst of physical, psychological, economic, and social forces that can powerfully shape attitudes, emotions, and behaviors. The committee sought to redress this limitation by examining the crucial role of risk factors and protective factors, which predispose a child to developmental disorders or modify their course and outcome. Indeed, it is by understanding the mechanisms through which these risk and protective factors operate that it will become possible to intervene more effectively in the future.

In this report, children are defined as individuals from the time of birth (or during gestation) through the high school years (and perhaps somewhat later). "Children" will be the term most often used to refer to the entire developmental period spanned by infancy, childhood, and adolescence.

THE SCIENTIFIC STUDY OF CHILDHOOD MENTAL DISORDERS

Children's mental disorders have received serious and sustained attention only during the past 100 years, beginning with Henry Maudsley's descriptive work in England, Sigmund Freud's case history of Little Hans in the first decade of this century (see Kaplan and Sadock, 1988), the establishment of the Juvenile Psychopathic Institute in Chicago by William Healy in 1909, and surveys of schoolchildren conducted by the National Committee for Mental Hygiene in 1915.

Current research on child mental disorders has profited from the knowledge accrued recently in the area of adult psychopathology. However, it should be emphasized that the study of child mental disorders is a unique field of endeavor, not simply a downward extension of research on adult mental disorders. Research into the causes and determinants of the disorders of children requires a developmental perspective. This perspective takes into account the emerging behavioral repertoire, cognitive and language functions, social and emotional processes, and changes occurring in anatomical structures and physiological processes of the brain over the course of childhood (Cicchetti, 1984, in press).

The developmental approach to the study of psychopathology, then, requires the researcher to be cognizant of these complexities. In practice, this includes a balanced weighting of biological, behavioral, and social factors and the interactions among them; an appreciation of changes over time; analysis of the risk and protective factors in the child and his or her environment; study of how emergent functions, competencies, and tasks of development modify the expression of a disorder or lead to new symptoms and difficulties; and awareness that a particular stress or underlying mechanism may result in different behavioral difficulties, at different times and in different contexts.

Current concepts about the origins of mental illness will be offered in this report, to the extent possible, from the integrative perspective of developmental psychopathology. Disorders are put into the context of developmental course. This orientation is consistent with the way in which a skillful clinician might formulate a case. The clinician calls upon a range of theories to show how a child's disorder can be placed within an account of his or her life history and related to many factors, including the child's biological constitution, unique experiences, personal development, and competence. The clinical case report also places the child in the context of a multigenerational narrative of the family and its community. Similarly, developmental psychopathology places children's disorders in the broader context of knowledge that has been gained about normal biological and behavioral development.

The Child Mental Health Research Community

Many diverse disciplines are related to child mental disorders. Some of them focus mainly on helping afflicted children and their families or on the social systems that provide needed services, such as schools, state and local agencies, and the various caregivers. Others address the causes of mental disorders, whether at the biological, psychological, or social level. Still others center around normal development, providing an essential context for understanding what can go wrong. Current research interests and capabilities of these disciplines vary enormously.

Clinical Disciplines

Central to any understanding of mental disorders is the systematic investigation of the disorders themselves. Many clinically oriented disciplines can contribute to such knowledge. Chief among them are child psychiatry, clinical psychology, pediatrics, psychiatric nursing, and social work. Additional professions, including education, speech and language pathology, occupational and physical

therapy, and juvenile justice, are involved in the many areas of daily living on which mental disorders can have a profound impact.

Collectively, these disciplines have a rich experience with the practical realities of caring for children and adolescents with mental disorders, but their perspectives on and approaches to care differ greatly. For example, child psychiatrists are the medical specialists primarily concerned with diagnosing and treating the more severe mental disorders. Many clinical child psychologists also diagnose and treat mentally disordered youngsters, while others are involved in preventive interventions and school-based programs. Pediatricians are responsible for broader health concerns and focus particularly on developmental and behavioral disorders that are related to physical health problems. Social workers are especially concerned with the systems in which mental health care is given, the ways in which children with mental disorders are identified, and the larger context of the family and community in which care must be provided. Nurses are involved in the care of mentally disordered youngsters in a variety of settings, including psychiatric hospitals, but, like pediatricians, some have responsibilities for the care of medically ill children who are at high risk for developing a mental disorder. Educators must cope with many of the day-to-day consequences of mental disorders as they attempt to provide appropriate learning opportunities. Juvenile justice professionals must cope with consequences of other types.

Many of the disciplines dedicated to providing care to children with mental disorders have not viewed research as integral to their mission. Fortunately, this attitude is changing, and systematic study of mental disorders is increasingly being coupled with ongoing efforts to treat them.

Basic Research Disciplines

The neurosciences examine how the brain and other parts of the nervous system work. Both the number of neuroscientists and the range of their explorations have increased dramatically over the past two decades. Among the neurosciences are neuroanatomy, neurochemistry, electrophysiology, neurophysiology, and neuropharmacology, along with key elements of molecular genetics, molecular biology, and cell biology. Their domain goes from the genes that control the development and maturation of the brain, through the many mechanisms that regulate the function of each nerve cell and of communication among them, to the interaction between the brain and behavior and thought. Progress in the neurosciences has been far more rapid than most people would have dreamed possible only a few years ago. For example, much has been learned about brain maturation and some of the ways in which brain systems guide behavior. Moreover, there is a growing awareness of how the developing brain is changed by what the

child experiences. In another area, scientists can now obtain images of the living, functioning brain and can determine which areas of the brain are involved in specific activities. A thorough understanding of neurological processes is vital to any effort to discover the causes of and possible treatments for many severe mental disorders of children.

The field of psychology focuses on the study of behavior, motivation, emotion, and the acquisition of cognitive and language skills. The various disciplines of psychology, especially developmental psychology, have had a continuing appeal to scientists over the past several decades, resulting in a large pool of talented investigators. An expanding body of excellent work now exists on how key psychological processes evolve over the course of development. To date, the bulk of research in this area has focused on the normal child; however, much of that research has direct relevance to childhood mental disorders, including studies on the competence of infants in forming bonds during the early months of life, the social and language development of young children, attentional mechanisms and the processes of learning, the way aggression and assertiveness toward family and peers are handled throughout childhood, and the interaction between endocrine maturation and emotional development during adolescence. Important research has also been conducted on the formation of self-image and the acquisition of coping styles.

The other social sciences, such as sociology and cultural anthropology, add a dimension that is especially relevant to research in this area: clarification of processes through which people establish and maintain relationships. Levels of study range from the family life cycle, through larger organizations such as schools, to entire communities and societies. Social scientists provide insights into how changes in family structure can alter a child's expectations and sense of self and how particular kinds of family interactional styles affect efforts to care for children with various types of mental disorders. They can also help identify how social structures such as schools impede or facilitate crucial developmental processes.

PREVIOUS REPORTS

There is a long tradition of reports and consensus statements on the mental and behavioral problems of children. They display a striking convergence over the decades and from all perspectives: this wealthiest of nations has millions of children with serious mental disorders, developmental disturbances, and behavioral troubles whose needs are inadequately met. From the 1909 White House Conference onward, reports describe the increase in knowledge about the causes of behavioral difficulties and about how best to serve these children and their families. There have been repeated calls to educate and mobilize the public to ensure funding for comprehensive mental health

services for children.[2] A conclusion from the Committee for Economic Development report (1987) can stand as a summary of the advocacy literature of the last several decades: "Literate, skilled, and adaptable people are our nation's most precious resource...as a society we must be willing to invest in building a better future for all our children."

This report differs from earlier ones in its focus on research. The committee is certainly aware of the distress of millions of children and families and of their need for services--now--to help alleviate the burdens of mental and behavioral disorders. But the committee also believes that more knowledge about the causes of these disorders and the development of demonstrably more effective treatments and preventive interventions are vital to the well-being of America's children.

REPORT OVERVIEW

This report offers the committee's appraisal of the current fund of knowledge concerning children with persistent and disabling mental disorders. These reviews are contained in Chapters 2, 3, and 4. They are not comprehensive; rather, they highlight areas of significant progress and set out the prerequisites for future advances. These chapters also contain specific recommendations for research opportunities in each area of study.

Chapter 2 addresses the scope and magnitude of these disorders by reviewing data on prevalence and costs. Conceptual issues are discussed, as well as the various systems for classifying these disorders.

Chapter 3 presents examples of recently acquired knowledge about the causes and determinants of these disorders. It expands on the importance of the developmental perspective, and it points to the inevitability and promise of multidisciplinary research.

Chapter 4 describes current treatments and rehabilitation services and efforts to appraise their safety, effectiveness, and cost. The chapter highlights recent progress in ensuring the reproducibility of treatments for adult mental disorders and advocates similar efforts for children's disorders. Progress in devising and evaluating preventive interventions is also reviewed, and an agenda for research to develop high-quality, cost-effective care is presented.

Chapter 5 appraises the current situation in child mental health research with regard to the number of active investigators and the availability of funds. Issues related to recruitment and training of new researchers are discussed, as are problems in attracting and retaining younger faculty as well as more established researchers.

The report closes with Chapter 6, which contains the principal conclusions and recommendations of the committee. The central recommendation is the call for a far-reaching national plan for the study of childhood mental disorders. An outline of the key elements of such a plan is included, along with specific cost estimates.

NOTES

1. No term is wholly adequate to convey the range of psychopathology. The term "disorders" has achieved acceptance, as a broad rubric without theoretical implications about etiology. The term "illness" may convey an implication that the troubles being discussed are like medical diseases or have a clearly established biological basis." "Disease" conveys a specificity and pathological implication which is inappropriate for most childhood mental disorders. Terms such as "conditions" or "problems" appear frequently in the report and are usually synonymous with disorder or syndrome.

The term "mental" is not quite right, either, since it seems to split the child into "mind" and "body." In some circles, "mental" is derogatory, and there are advocacy groups, such as the parents of autistic children or those with Tourette's disorder, who feel that having these disorders classified as "mental disorders" has an etiological implication which slights their biological foundations. The triad "mental, behavioral, and developmental disorders" conveys the spectrum, but it may also mistakenly imply that there are conceptually clear distinctions among these categories. There are also semantic concerns about whether the field of inquiry should be called "mental health" (as in the National Institute of Mental Health) or "mental illness/disorder" (for which individuals come to treatment). There are no terms now that satisfy everyone concerned. The committee opts for "mental disorders" and "mental health research," but it uses other terms as well and hopes that the context will make the intent clear.

2. One line of reports emanated from the White House Conferences on Children. The first such conference, in 1909, recommended programs for dependent children, as well as the creation of a Federal Children's Bureau. This theme was further expanded in the 1930 conference to include not only the dependent child and the child in special need of protection, but also the social and environmental factors which influence the development of the child. Specific recommendations were given concerning the mental health of

children, including the need for special services to assure each child's right to normal development (White House Conference, 1930). The 1940 conference addressed all aspects of child welfare, including education, health, home life, and preparation for the duties of citizenship. As stated by President Roosevelt in his opening address, "Democracy must inculcate in its children capacities for living and assure opportunities for the fulfillment of those capacities" (White House Conference, 1940, p. 1). The 1970 conference called for a comprehensive child health care system and made child advocacy for all children, especially those at risk, a central recommendation (Office of Child Development [OCD], 1972; White House Conference, 1971).

The 1970 White House Conference occurred soon after the landmark report of the Joint Commission on the Mental Health of Children (1969). The commission brought together the leaders in children's mental health at a time of optimism concerning social change on behalf of children. Members of the commission described vividly the plight of emotionally disturbed and handicapped children, as well as children at risk because of poverty, and envisioned a multi-tiered system of child advocacy with federal, state, local, and community advocates and comprehensive medical and developmental programs. The commission described the close connections between prevention and early intervention for children at risk and treatment for those already burdened with disabilities. Research was emphasized less than services, but special attention was given to studies on nosology and treatment.

In the early 1970s, the Office of Child Development of the U.S. Department of Health, Education, and Welfare commissioned the Project on the Classification of Exceptional Children (1971). The conceptual and regulatory confusion surrounding classifications and labeling were described in its report, including how diagnosis may serve institutions rather than children. The OCD project recommended that services follow children's needs, not bureaucratic convenience; that all handicapped children, regardless of impairment, be educated; and that schools serve as advocates for these children. This project preceded the passage of the Education for All Handicapped Children Act (P.L. 94-142), which embodied its philosophy.

The Task Panel on Infants, Children, and Adolescents of the President's Commission on Mental Health (1978) convened many of the nation's mental health leaders and provided a broad, sweeping overview of the scope of mental illness, including a summary of available epidemiological knowledge. The panel

reviewed the state of knowledge concerning causes and treatment, and the continuities between childhood and adult disorders. The panel emphasized that psychiatric and other mental health services were as vital to children as other health services, deplored the paucity of services for adolescents, and described the particular burdens of minority and poor children. The commission emphasized preventive services, the inclusion of mental health services in comprehensive pediatric care, a continuum of services based on intensity of needed care, increased numbers of child mental health professionals, and expansion of research on causes of disorders and their treatment. The commission's Task Panel on Research provided a detailed appraisal of issues relevant to mental health research. The panel's emphasis on areas such as epidemiology and neuroscience, and on the importance of research training and support of research careers, anticipated several of this committee's conclusions.

The Select Panel for the Promotion of Child Health reported its findings in Better Health for Our Children (1981). This report praised the intent of P.L. 94-142 but recommended enhancement of services, including improved identification and early treatment of mental disorders and other handicapping conditions, better coordination of mental health and other services, improved monitoring of availability and quality of care provided under P.L. 94-142, and more family involvement.

The Children's Defense Fund Survey of State Mental Health Programs, reported by Jane Knitzer (1982), received wide attention because of its scholarship and the clarity of its argument. The study revealed inadequacies of inpatient and residential treatment programs, their expense, the lack of coordination among social systems (child welfare, juvenile justice, mental health, education), the poor tracking of children through any system, and the limitations of services for emotionally disturbed children through P.L. 94-142. The report recommended improved identification of children in need, improved coordination of services by means of a child advocacy system, and increased funding through targeting of money to children's services within the federal Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA) block grants.

The Office of Technology Assessment's study, Children's Mental Health: Problems and Services (1986), reviewed various treatment approaches and assessed whom they served, their effectiveness, and financial implications. The report cited the need "for improved delivery of mental health

services to children. Clearly, the mental health services currently available are inadequate, despite a substantial theoretical and research base suggesting that mental health interventions for children are effective" (p. 10).

In 1988, a child advocate, Lisbeth Schorr, analyzed the current status of children's services in the tradition of the White House Conferences and joint commission. Schorr's report, Within Our Reach: Breaking the Cycle of Disadvantage (1988), conveys the plight of multiproblem, poor families whose disorganization and range of troubles transcend any diagnostic or bureaucratic system. Schorr described the inadequate and fragmented services generally available to such families and model services that seem to provide effective interventions.

These reports represent only a very small selection of the prominent statements that have appeared during this century. An important new addition to the voices raised in concern about children's development has been that of America's business leadership. The Committee for Economic Development's recent report, Children in Need: Investment Strategies for the Educationally Disadvantaged (1987), concludes that the optimal and healthy development of children is central to how productive we can be as a nation and therefore to how competitive we can be in the world market.

References

American Psychiatric Association. (1987). Diagnostic and statistical manual of mental disorders (3rd ed., rev.). Washington, DC: Author.

Cicchetti, D. (1984). The emergence of developmental psychopathology. Child Development, 55, 1-7.

Cicchetti, D. (in press). An historical perspective of the discipline of developmental psychopathology. In J. Rolf, A. Masten, D. Cicchetti, K. Nuecherlein, & S. Weintraub (Eds.), Risk and Protective Factors in the Development of Psychopathology. New York: Cambridge Press.

Committee for Economic Development. (1987). Children in need: Investment strategies for the educationally disadvantaged. New York: Author.

Education for All Handicapped Children Act, Pub. L. No. 94-142, 89 Stat. 774, 775 (1975).

Gould, M., Wunsch-Hitzig, R., & Dohrenwend, B. (1981). Estimating the prevalence of childhood psychopathology. Journal of the American Academy of Child Psychiatry, 20, 462-476.

Joint Commission on Mental Health of Children. (1969). Crisis in child mental health: Challenge for the 1970's. New York: Harper & Row.

Kaplan, H. I., & Sadock, B. J. (1988). Synopsis of psychiatry: Behavioral sciences, clinical psychiatry (5th ed.). Baltimore, MD: Williams & Wilkins.

Knitzer, J. (1982). Unclaimed children. Washington, DC: Children's Defense Fund.

Office of Child Development. (1972). Strategies for implementation: 1970 White House Conference on Children: Follow-up report. Washington, DC: U.S. Government Printing Office.

Office of Technology Assessment (1986, December). Children's Mental Health: Problems and Services--A background paper (Publication No. OTA-BP-H-33). Washington, DC: U.S. Government Printing Office.

President's Commission on Mental Health. (1978). Task panel reports submitted to the President's Commission on Mental Health (Vols. 1-4). Washington, DC: U.S. Government Printing Office.

Schorr, L. B. (1988). Within our reach: Breaking the cycle of disadvantage. New York: Doubleday.

Select Panel for the Promotion of Child Health. (1981). Better Health for our children: A national strategy. Report presented to the U.S. Congress and the Secretary of Health and Human Services. Washington, DC:

U.S. Department of Health, Education, and Welfare. (1971). Project on the classification of exceptional children: Report of the conference on the use of stimulant drugs in the treatment of behaviorally disturbed young school children. Washington, DC: Office of Child Development.

White House Conference. (1930). Addresses and abstracts of committee reports, White House conference on child health and protection. New York: The Century Co.

White House Conference. (1940). Children in a democracy: General report adopted by the White House conference on children in a democracy. Washington, DC: U.S. Government Printing Office.

White House Conference. (1971). White House conference on children: Report to the President. Washington, DC: U.S. Government Printing Office.

World Health Organization. (1978). Mental disorders: Glossary and guide to their classification in accordance with the ninth revision of the international classification of diseases. Geneva: Author.

CHAPTER 2

DIMENSIONS OF DISORDER

This chapter focuses on recent data concerning the scope and magnitude of the mental, behavioral, and developmental disorders of children. It supplements the work of earlier reports and emphasizes the severity and diversity of these disorders in terms of their clinical presentation, course, and sequelae. The chapter also highlights areas of research in which progress is being made and identifies high-priority areas for future research.

SCOPE

Categories of Childhood Mental Disorders

Childhood mental disorders vary in age of onset, types of symptoms, course, methods of treatment, and level of impairment. Table 2-1 presents selected categories of mental disorders that appear or are first recognized in infancy, childhood, or adolescence. They encompass conditions ranging from emotional disturbances such as depressed mood or crippling states of anxiety and behavioral problems characterized by disruptive and antisocial acts to developmental impairments that limit a child's ability to think, learn, form social attachments, or communicate effectively with others.

These categories are not mutually exclusive--in fact, many children have two or more problems. This "comorbidity" complicates both diagnosis and treatment. Diagnostic procedures must ensure that a wide range of disorders is considered, and treatment plans must take into account the various interventions required for the coexisting conditions (Kovacs, Feinberg, Crouse-Novak, and Paulauskos, 1984; Offord, Adler, and Boyle, 1986; Puig-Antich, 1982; Puig-Antich and Chambers, 1978; Sandberg, Wieselberg, and Shaffer, 1980).

Clinical Descriptions

The nature and extent of the problem of child mental disorders can be demonstrated by categorizing groups of disorders, estimating the number of afflicted children, and calculating the economic costs to society. Such cumulative data, however, omit the stark reality of the effects severe mental disorders have on individual children and their families. The following case studies illustrate the diversity of

TABLE 2-1: Selected DSM-III-R Categories of Mental Disorders Affecting Infants, Children, and Adolescents

- Mood disorders
  - Bipolar disorders
  - Depressive disorders
- Anxiety disorders
- Eating disorders (including anorexia nervosa and bulimia nervosa)
- Disruptive behavior disorders
  - Attention-deficit hyperactivity disorder
  - Conduct disorder
- Psychoactive substance abuse disorders
- Schizophrenia
- Developmental disorders
  - Mental retardation
  - Pervasive developmental disorders (including autism)
  - Specific developmental disorders (including reading disorders)
- Tic disorders (including Tourette's disorder)
- Gender identity and sexual disorders
- Personality disorders

Adapted from: American Psychiatric Association. (1987). Diagnostic and statistical manual of mental disorders [DSM-III-R] (3rd ed., rev.). Washington, DC: Author.

conditions and offer a more personal perspective. They are presented chronologically, based on age of onset of the disorder.

Case Study 1: Autism. John is five years old. He was referred to a child psychiatrist because of delayed speech development and poor peer relationships. His mother

describes him as "living in a shell" and feels he never developed a close, loving relationship with her. He did not begin to speak until the age of three, and even now has a limited vocabulary of only about 200 words. Most of his speech consists of repetitive phrases heard on television, or simple requests or demands. He is unable to initiate or sustain a conversation with peers or adults.

John demonstrates a number of unusual behaviors and interests. For example, he is fascinated with water and often will spend long periods of time intently watching water dripping into a basin. He shows no interest in playing with toys in a usual way but would rather arrange objects in a straight line or else talk jargon to himself while rocking back and forth. He shows little interest in usual children's shows on television; he would rather watch adult game shows. He becomes very upset if furniture is moved around in the house and was inconsolable when his parents bought a new car.

His nursery school teacher says he has an amazing facility for numbers and letters, but she is concerned because he would rather stay by himself than play with other children. John communicates little with his teacher and seems odd and aloof, "in his own world."

When John was three, his mother was told by the family doctor that John probably would grow out of these problems. John's mother senses now that John is suffering from a severe and chronic condition.

Autism begins early in life and usually results in a lifetime of marked impairment in functioning. Once thought to be a disorder of abnormal parenting, autistic and related disorders are now believed to be primarily biological in origin. Autism is one of a class of pervasive developmental disorders that are characterized by widespread distortion of many aspects of development. Afflicted children, such as John, exhibit impaired social relationships and are unable to establish the ties of affection that typify the normal parent-child relationship. They display unusual or bizarre responses to the environment (such as resistance to change), catastrophic reactions to everyday occurrences, and too little or too much sensitivity to all kinds of environmental input. Deficits in language development are apparent, as the children either fail to develop speech or display peculiar speech patterns. Repetitive ritualistic movements and positioning the body in unusual postures are also common.

Autistic children typically exhibit a number of associated problems. Approximately three-quarters of them are mentally retarded. Seizure disorders develop in approximately 25 percent of

cases, especially in adolescents with more significant mental retardation (American Psychiatric Association, 1987). In adulthood, at least two-thirds of autistic individuals require fully structured environments with round-the-clock supervision, and only a very few "high functioning" autistic individuals are capable of anything close to independent living as adults (Kaplan and Sadock, 1988). Several excellent reviews provide systematic discussions of this topic (Campbell, 1987; Campbell and Schopler, 1989; Cohen and Donnellan, 1987; Lovaas, 1987; Rutter, 1985).

Case Study 2: Conduct Disorder. Robbie, now 13 years old, is described by both of his parents as having always been a difficult child. As a toddler he was very active and stubborn, and his parents felt that, even at that young age, their attempts at discipline were largely ineffective.

Nursery school teachers observed that Robbie was unusually distractible and impulsive. In the early elementary school grades there were complaints not only about his distractibility and impulsivity, but also about his aggressive and antagonistic behavior toward other children. At age seven, Robbie was diagnosed by a school psychologist as having attention-deficit hyperactivity disorder, and Robbie was placed in a smaller, more structured classroom. Despite adult interventions, Robbie would fight with his classmates and was ostracized by them. At times, one could sense that he suffered because of his loneliness and perhaps low self-esteem, but he was reluctant to discuss these issues with his parents or teachers.

In the intervening years the situation worsened. Robbie was expelled or suspended on numerous occasions. Now in middle school, he attends a class for children with behavioral problems and is working well below grade level. He has no friends and engages in no extracurricular activities, having recently been kicked off the soccer team for fighting. He began smoking at 10, and there is evidence that he now drinks alcohol fairly regularly and has used marijuana and perhaps other drugs on occasion. He hangs around with older adolescents and was recently arrested for shoplifting.

Robbie's parents feel they cannot control him, and they want him placed outside the home. Robbie himself says he knows that people think he is a "loser" and a troublemaker, but he blames his family, and "can't wait to be on my own."

Conduct disorder may have precursors in the preschool years, but it does not become fully apparent until later in childhood or

adolescence. The essential feature is a persistent pattern of behavior in which the basic rights of others and major age-appropriate social rules or expectations are violated. Physical aggression is common. Children with conduct disorder initiate fights and can be physically cruel to people and animals. They may steal, and the stealing may involve confrontations with the victim, as in a mugging or armed robbery. Often a youngster with this condition has a history of truancy from school and episodes of running away from home (Offord et al., 1986; Robins, 1974).

Children with conduct disorder are at increased risk for alcohol and drug abuse. Many continue to have similar difficulties in adult life. For instance, the frequent physical fights in the school years can escalate into assault or even homicide. It has been found that the vast majority of serious antisocial behavior in adulthood begins as conduct disorder in childhood and early adolescence (Patterson, DeBaryshe, and Ramsey, 1989). Almost half of all clinically identified antisocial youngsters become antisocial adults (Robins, 1966, 1970). A description of research-based approaches to treatment for this condition is included in Chapter 4.

Case Study 3: Depressive Disorder. Bridget is a depressed 16-year-old who went to a hospital emergency room after cutting her wrists with a razor blade. She was withdrawn, downcast, at times crying quietly, and nervously avoiding eye contact with the interviewer. She reported that she first began feeling miserable and hopeless about two months ago. She found she could not concentrate at school, her grades dropped from A's and B's to C's and D's, she stopped calling her friends, and she showed no interest in her piano lessons despite her aspiration to be a musician. Two weeks ago she stopped attending school, stating that she had neither the energy nor the interest to continue. She eats very little, thinks she may have lost some weight, and for the past month has been waking up at about five o'clock in the morning and is unable to get back to sleep. She thinks frequently of suicide, believing that her family would be better off without her. She used to have hopes for the future but now sees nothing good for herself, explaining that she will never complete school or obtain a good job.

Bridget recalls that life was always hard but never this hard. Her natural parents are both alcoholics, as are her maternal grandfather and two maternal uncles. Her parents separated when she was three, and for the past 12 years she has lived with her mother and stepfather, who is also an alcoholic. Bridget reported that her stepfather beat her mother when he was drunk but never hit her. At the time of

referral, Bridget and her mother were living in a downtown shelter for battered women, and the staff there had encouraged her to seek help.

Bridget has had a good initial response to treatment. She was put on antidepressant medication and began twice-weekly psychotherapy sessions. Five weeks after the initial referral, her depressive symptoms had abated markedly. She was back in school and was preparing an application for entry into a music conservatory. She was living in a one-room apartment with her mother, who had found a part-time job. Although Bridget's course of treatment is far from completed, her doctor is cautiously optimistic about the eventual outcome.

Depressive disorder is episodic in nature: at onset there is an abrupt change from previous functioning, and recovery is associated with a return to the previous level of adjustment. Depressive disorders can occur in prepubertal children but are much more common in adolescents. The essential feature is a persistent depressed mood for at least a two-week period. It is accompanied by a loss of interest or pleasure in all, or almost all, usual activities.

The most serious complication of the disorder is suicidal behaviors as in the case of Bridget. Associated symptoms include appetite disturbance (usually loss of appetite), change in weight, sleep disturbance (usually insomnia), psychomotor agitation or retardation, decreased energy, feelings of worthlessness or excessive guilt, difficulty thinking or concentrating, and recurrent thoughts of death, contemplation of suicide, or attempts at suicide. The above case study shows the beneficial effect of an intervention program for adolescent depressive disorder. Additional information on childhood depression is given in Chapter 3 and in recent reviews by Kovacs (1989), Poznanski (1982), Puig-Antich (1984), Puig-Antich, Ryan, and Rabinovich (1985), Rutter, Izard, and Read (1986), Ryan et al. (1987), and Shaw (1988).

These three case studies provide examples of the diverse clinical symptoms associated with childhood mental disorders. The second case illustrates one common form of comorbidity (conduct disorder and attention-deficit hyperactivity disorder). All of these conditions result in much suffering for the child and his or her family. They entail severe impairments that, in many cases, extend well beyond childhood.

Populations at High Risk

The identification of groups of children who are at high-risk of developing a mental disorder is important because of its implications

for both the equitable distribution of clinical resources and the design and implementation of preventive intervention programs. The identification of specific risk factors associated with particular disorders or classes of disorder may also provide valuable clues to how and why disorders develop. This point is forcefully made in the next chapter, which addresses research on the causes and determinants of these diverse conditions.

In this report, risk factors are defined as variables that are associated with an increased probability of disorder (Offord, in press). Such factors must predate the disorder and must plausibly contribute directly to the occurrence of the disorder. Risk factors may be intrinsic or extrinsic.

Among the children at risk because of extrinsic factors are children whose parents are mentally ill or substance abusing, or both (Beardslee, Son, and Vaillant, 1986; Earls, Reich, Jung, and Cloninger, 1988; Rutter, 1987; Schonfeld, Schaffer, O'Conner, and Portnoy, 1988; Weissman et al., 1987); children with chronic medical illnesses (Cadman et al., 1986; Cadman, Boyle, Szatmari, and Offord, 1987); children living in foster care (Keane, 1983; Tuma, 1989); Native American children from certain tribes, whose risk of suicide may be as much as 2.3 times that for the U.S. population of the same age (May, 1987); children in families living on welfare (Offord, Boyle, and Jones, 1987); and homeless children (Alperstein, Rappaport, and Flanigan, 1988; Bassuk and Rosenberg, in press; Institute of Medicine 1988). Each of these high-risk groups has rates of diagnosable mental disorders far exceeding those believed to exist in the general population. The mechanisms which determine the high-risk status of these groups are not always clear, but plausible hypotheses may be offered in each case. For example, children of depressed, alcoholic, or schizophrenic parents have been studied extensively, and patterns of transmission from generation to generation are well-established. Although the exact mechanisms for the transmission are unclear, genetics, social learning, and being reared by an ill parent all offer plausible hypotheses for future research--as well as the challenge of measuring combined causation.

Other external risk factors include prolonged parent-child separation and lack of consistent caretakers (Tennant, 1988); living in crowded, inner-city neighborhoods (Offord, Boyle, Szatmari, et al., 1987; Rutter, 1976); physical or sexual abuse (Allen and Oliver, 1982; Green, Voeller, Gaines, and Kubie, 1981; Mrazek and Mrazek, 1981); catastrophic events (Bromet, Hough, and Connell, 1984; Bromet and Schulberg, 1986); bereavement (Osterweis, Solomon, and Green, 1984; Krupnick and Solomon, 1987), and marital discord and instability in the family environment (Rutter, 1987).

Intrinsic factors leading to increased risk of childhood mental disorders include low birth weight (Stewart, 1983), developmental delay (Nichols and Chen, 1981), brain damage (Brown, Chadwick,

Shaffer, Rutter, and Traub, 1981), epilepsy (Lindsay, Ounsted, and Richards, 1979), early difficulties with temperament (Earls and Jung, 1987; Maziade et al., 1985), and mental retardation (Rutter, Tizard, and Whitmore, 1970).

Each of these factors markedly increases the risk of psychopathology, and many of them tend to occur in combination. Thus, caution should be used in drawing inferences about the importance of any single indicator of risk until research can clarify its unique contribution.

Even less is known about protective factors, which may reduce the risk of psychopathology in children exposed to adversity. Potential protective factors include good problem-solving ability, good social skills, a warm, caring relationship with an adult inside or outside the home, and compensatory experiences outside the home (Garmezy, 1985; Rutter, 1985). The subject of the interaction between risk and protective factors over the lifetime of the child is discussed in more detail in Chapter 3.

MAGNITUDE

Prevalence of Disorders

There are relatively consistent and compelling findings on the overall prevalence of mental illness among children. For example, in 1969 the Joint Commission on the Mental Health of Children estimated that 13.6 percent (or 8.8 million) of all children under the age of 18 suffered from a mental disorder. Similarly, Gould, Wunsch-Hitzig, and Dohrenwend (1981) found that the median rate of "maladjustment" among children in the general population was 11.8 percent (or about 7.5 million children). A careful review of the literature in this area provided by the Office of Technology Assessment's report on children's mental health (OTA, 1986) also concluded that at least 7.5 million children were in need of some sort of mental health services.

The President's Commission on Mental Health (1978) determined that between 5 and 15 percent (or 3.0 to 9.6 million) of all children were in need of mental health services. The lower end of this range represented children who the commission felt were severely disturbed, while the upper range included all children deemed to need intervention. When severe disturbance alone is considered, the discrepancies among studies are slightly larger. For example, the National Plan for the Chronically Mentally Ill, set forth by the Department of Health and Human Services, suggested that 8 percent of all children had a severe mental disorder (OTA, 1986).

The commonly accepted number of children identified in these studies as suffering from a mental disorder is between 12 and 15

percent.[1] A series of recent studies suggest that prevalence may now range between 17 and 22 percent (or 11 to 14 million children), depending on a number of factors (see Table 2-2). Because these data are preliminary, however, the committee decided to use the most conservative estimate that could be justified by the earlier studies--namely, 12 percent of the 63 million children in this country under age 18. Of these 7.5 million children, nearly half are deemed severely disordered or handicapped by their mental illness (OTA, 1986). The committee also recognizes that this figure may exceed 20 percent in some populations, such as inner-city children, who are exposed to severe psychosocial adversity.

The fact that so many children are affected should not suggest that these mental disorders are trivial or transient; on the contrary, childhood mental disorders are serious, persistent, and lead to suffering for the children and their families. Mental illness in childhood is also costly and a burden to society, which must care for children and deal with the results of their difficulties in school and other social systems (OTA, 1986; IOM, 1985). Mental disorders of childhood often require long-term care and reduce the individual's ability to lead a normal, productive adult life (Stroul and Friedman, 1986).

Short- and Long-Term Consequences

The three types of childhood mental disorders on which the most longitudinal information has been gathered are pervasive developmental disorders (especially autism), antisocial behavior or conduct disorder, and emotional disorders. This latter category includes both anxiety and depressive disorders. The long-term outcomes for children with autism and conduct disorder were discussed in the case studies presented at the beginning of this chapter.

The long-term outcomes for children with emotional disorders are not well understood; however, researchers have studied the similarities and differences in expression of depression among prepubertal children, adolescents, and adults. The recent longitudinal work of Kovacs and her colleagues (1984) on childhood depression suggests that the occurrence of this disorder in childhood and early adolescence may presage chronic difficulties in the teenage years. Another study of adolescent girls with depressive symptoms suggests continuity with adult depression (Kandel and Davies, 1982), although this study did not apply rigorous diagnostic criteria. While obsessive-compulsive disorder in children is rare, data suggest that it is persistent (Hollingsworth, Tanguay, Grossman, and Pabst, 1980). Further, Rutter and colleagues (Rutter, Tizard, Yule, Graham, and Whitmore, 1976) have noted that anxiety problems occurring at inappropriate periods of development, such as school phobias arising in adolescence, can signal considerable impairment in functioning in adulthood.

TABLE 2-2: Prevalence of DSM-III Diagnoses in Nonclinic Samples by Informant and Age

	Anderson et al. (in press)	Bird et al. (in press)	Velez et al. (in press)	Costello (in press-b)	Offord et al. (in press)
	Child (interview) Parent, Teacher (Checklist) n=782 age 11	Child, Parent (Interview) n=777 age 4-16	Child, Parent (Interview) n=776 age 11-12	Child, Parent (Interview) n=789 age 7-11	Parent, Teacher (Checklist) n=2,679 age 4-16
Diagnosis			Prevalence (%)		
Attention-deficit disorder (± hyperactivity)	6.7	9.9	4.3	2.2	6.2
Oppositional disorder	5.7	9.5	6.6	6.6	N/A
Conduct disorders (all types)	3.4	1.5	5.4	2.6	5.5
Separation anxiety	3.5	4.7	5.4	4.1	
Overanxious disorder	2.9	N/A	2.7	4.6	9.9 ("emotional disorder")
Simple phobia	2.4	2.3	N/A	9.2	
Depression, dysthymia	1.8	5.9	1.7 (major depression)	2.0	
Functional enuresis	N/A	4.7	N/A	4.4	N/A
One or more diagnoses	17.6	18.0	20.6	22.2	18.1

Adapted from: Costello, E. J. (in press-a). See the endnote to this chapter.

A recent study by Christie et al. (1988) uses data from the NIMH Epidemiologic Catchment Area (ECA) program to examine early onset of mental disorders. Their dramatic findings showed that for adults with anxiety disorders, the median age of onset was 15 years. Although previous work had found the teenage years to be an important period for the onset of depressive disorders and schizophrenia, this study is the first to demonstrate the high frequency with which anxiety disorders persist from childhood and adolescence to adulthood. These findings are important because anxiety disorders were found to be quite common in the ECA sample of adults (for further review of the ECA program, see Eaton, Regier, Locke, and Taube, 1986).

Schizophrenia, a common adolescent and adult disorder, has been thought by a number of observers to have childhood antecedents. Studies of individuals at high risk for schizophrenia, primarily the offspring of a schizophrenic parent, for whom the risk of developing schizophrenia is ten times greater than for the general population, have revealed few specific predictors. These studies have found neurodevelopmental immaturities, attention deficits, and impaired interpersonal relationships to be associated with later onset of schizophrenia (Rutter, 1984). Evidence for continuity is dependent on how broadly or narrowly one defines antecedents or precursors. Watt, Anthony, Wynne, and Rolf (1984) retrospectively studied the childhood school records of persons diagnosed with schizophrenia as adults. The main findings included poor interpersonal skills, which differed by sex: preschizophrenic boys were aggressive and emotionally unstable, whereas preschizophrenic girls were more often withdrawn and isolated. However, these characteristics were noted in only half the individuals who later became schizophrenic.

Follow-up studies of children referred for treatment of another disorder indicate that those who later became schizophrenic manifested limited antisocial behaviors (not directed outside family and acquaintances), were not affiliated with antisocial peer groups, and were described as having depressive, worrying, overly dependent behavior (Robins, 1966). Other studies have identified a premorbid course of social isolation and odd behavior, which was associated not with shyness but with active rejection by the peer group, in children who later developed schizophrenia (Rutter, 1984).

Most studies of the effects of parental mental disorder on children have been designed to study the relation of a single family risk to a single child outcome, for example, to associate a mother's diagnosis of schizophrenia with similar characteristics in the child. However, stronger continuities are found when multiple parental characteristics are studied in relation to general measures of childhood problems. In a longitudinal study comparing preschool offspring of schizophrenics with those of women with other mental disturbances, it was found that the specific mental disorder diagnoses of the parent contributed little to the child's outcome. Much more

predictive were general factors such as social class of the family and the severity and chronic nature of the parental illness, regardless of diagnosis (Sameroff, Seifer, Zax, and Barocas, 1987). Studies that are using more complicated interactional models are illuminating this complex problem of schizophrenia etiology. In a Finnish study of adopted offspring of schizophrenics, the occurrence of schizophrenia was much more frequent in those who had been raised in adoptive families exhibiting significant psychopathology (Tienari et al., 1987). Such studies emphasize that continuity or discontinuity of outcome is determined by the pattern of risk and protective factors in the development of the child rather than by any isolated characteristic of the child.

The Costs of Childhood Mental Disorders

The magnitude of the problem of childhood mental disorders is only partially reflected in epidemiological data about prevalence and incidence of disorders. Substantial evidence suggests that many childhood disorders extend into adulthood either because of their chronic course or because of their adverse effects on the child's development (Kazdin, 1989). Moreover, enormous financial and social costs can be associated with mental disorders in children and adolescents.

The costliness of a birth defect with neuropsychiatric consequences, fetal alcohol syndrome (FAS), has been explored in a comprehensive study by Harwood and Napolitano (1985). The authors found costs related to both the physical and the mental aspects of FAS. In addition to direct treatment expenses associated with mental impairment, there are costs associated with special services (such as special education) and indirect costs associated with lost productivity due to limitations on the children's ability to function in society as adults. They concluded that, as of 1980, the total lifetime cost of FAS would average $596,000 per child.

In studies such as those by Harwood and Napolitano (1985), direct costs are documentable expenditures for real goods and services such as treatment costs and health services. Relevant nonhealth expenditures, such as special education, child welfare, and criminal justice services, may also be calculated in direct costs. Indirect costs, on the other hand, reflect the estimated loss of potential productivity due to illness, handicap, or premature death. The intangibles associated with an illness (for example, the emotional cost to siblings and the family system) are often mentioned but rarely analyzed because of the difficulty of quantifying them.

Many of the more severe childhood mental disorders can last a lifetime, and the costs of these disorders should be figured accordingly. However, there is a lack of systematic research in this

area. Studies are needed to determine the true magnitude of these costs so that sufficient resources can be allocated for research and services.

Direct Costs

Health-related Costs According to a forthcoming national study on the economic costs of alcohol, drug abuse and mental illness for 1985 (Rice, Kelman, and Dunmeyer, in progress), direct costs were overwhelmingly the costs of providing treatment for mental disorders. Only a small proportion of the total represents the costs of services in settings such as prisons and schools. The costs reported in this study were estimated from the records of hospitals and clinics and from surveys of physicians and other mental health providers.

The results of the Rice et al. (in progress) data indicate that the cost of direct treatment for mental illnesses in 1985 was $35 billion for all age groups, with at least $1.5 billion attributed to direct services for children primarily age 14 and under (costs of care for adolescents age 15 to 18 are largely unrepresented in this figure). This figure of $1.5 billion underestimates the direct costs of mental illness for children 14 and under, for several reasons. First, there is considerable evidence that mental health services are unavailable for a majority of children in need of treatment (see Knitzer, 1982; Saxe, Cross, and Silverman, 1987). The Office of Technology Assessment (1986), for example, estimated that the number of children and adolescents receiving some form of treatment is probably in excess of 2.5 million, with approximately 5 million more in need of mental health services.

Second, many children and adolescents who receive treatment for mental disorders through physicians' offices, hospitals, child guidance clinics, schools, and community centers are not "counted." The majority of all diagnosed mental disorders in children and adolescents are probably treated by mental health professionals such as nonpsychiatric physicians, social workers, and educators working in nontraditional settings (OTA, 1986; Tuma, 1989). Not surprisingly, costs of treatment vary greatly, depending on who provides the service and in what setting. In many instances, insurance coverage adds to the confusion, because nearly all policies in this country have markedly more limited coverage for mental than for physical disorders, which may distort the kinds of diagnoses being made (Select Committee on Children, Youth and Families, 1987).

Finally, mental disorders do not exist in isolation from other disorders that affect children, such as alcohol and drug abuse or chronic physical disorders, so efforts to separate the costs associated with mental disorders alone can only be approximate. What is clear is that the costs of treating these problems place a substantial burden on both families and society.

In an effort to shed more light on this issue, the Institute of Medicine commissioned a study to compare the treatment costs of mental disorders with the treatment costs of physical disorders among a population of children and adolescents who were dependents of employees of a major manufacturing company in the North Central states, using available data from 1984 through 1986 (Health Data Institute, 1988). The results are given below, not as definitive statements of the actual costs of childhood mental disorders, but as an illustration of the kinds of analyses needed in this area.

The analysis was based on claims filed with the company's primary health insurance plan. Of the total of $16.7 million spent on hospital inpatient care for all pediatric admissions, $2.7 million (16 percent) was for mental disorders among children age 18 and under. The total costs of outpatient pediatric care in physicians' private offices were $4.9 million, of which about $1 million (23 percent) can be attributed to care of children and adolescents with mental disorders.

These data are an underestimation of the true costs for this population, because there is a 20-day limit on the length of stay for each hospitalization for mental disorders, and office-based care is limited to 25 visits per year for mental health services. Also, these insurance data do not include outpatient mental health care provided by non-physicians such as independently practicing psychologists and social workers.

Although the results of this analysis cannot be considered representative of the nation, they do suggest that childhood mental disorders serious enough to require treatment can result in costs comparable to those for physical illnesses in children. This analysis also suggests a strategy--that is, comparison of the costs of mental and physical disorders--for demonstrating economic costs of childhood mental disorders.

Another strategy for demonstrating the costliness of childhood mental disorders is to compare treatment costs or length of hospital stays for children with those of adults. Available data indicate that in 1986 children under age 18 accounted for 12 percent of all psychiatric hospital days, while adults accounted for 88 percent (Manderscheid, 1989). This 12 percent figure does not fully reflect the magnitude of the problem of severe childhood mental disorders, yet factoring out the costs of these disorders remains elusive.

Non-health-related Costs Non-health-related costs contribute significantly to the burden of childhood disorders. Social systems such as the educational, child welfare, and juvenile justice systems are also responsible for providing needed services for disturbed children and adolescents. The prevalence of childhood psychopathology within these systems and the cost of these services provide important

information for understanding the social costs of childhood mental disorders. A brief discussion of the potential costs of providing care to children with mental disorders within each of these systems follows (OTA, 1986; Tuma, 1989).

It is estimated that during the 1985-86 school year, only 377,000 children and adolescents with serious emotional disorders were receiving education or related services through the nation's educational system under Public Law 94-142, The Education for all Handicapped Children Act (Select Committee on Children Youth and Families, 1987). The direct cost of educational services for seriously disturbed children and youth varies by state. According to the U.S. Department of Education (Moore, Strang, Schwartz, and Braddock, 1988), the average cost per student ranged from $5,400 to $6,204 for the 1985-86 school year. In addition to expenses associated with educating children with mental disorders, social costs should be calculated in terms of the lost learning potential caused by the impairment. Even if the debilitating effects of the disorder could be reduced with treatment, there are indirect costs related to interference with age-appropriate functioning and with future development and skill acquisition.

The child welfare system in this country is composed of a number of social services to assist families in need or to protect children in dysfunctional family situations (adoption, foster care, child abuse and neglect protective services, and so on). More than 500,000 children under the age of 18 are living in out-of-home placements through the child welfare system (Knitzer, 1982). Although an exact figure is not available, a great many of the children placed in protective custody through the child welfare system are in urgent need of professional help for mental disorders. However, it has been estimated that, of the 270,000 children currently in foster care, about 85 percent do not receive adequate mental health treatment (Tuma, 1989).

In 1985, more than 49,000 children were held by the justice system in public juvenile facilities in this country (Flanagan and Jamieson, 1988), and many thousands are in adult facilities as well. According to a study on the need for mental health services for children and adolescents (Knitzer, 1982), state data suggest that 30 to 58 percent of incarcerated juveniles have at least one mental disorder. The average cost of care for an incarcerated juvenile for one year ranged from $15,200 to $66,100 in 1984, depending on the state; the average per person cost was $25,200 (Flanagan and Jamieson, 1988). Since a significant number of children with serious emotional or behavioral problems end up in the juvenile justice system, these expenses are an important part of the social costs of child and adolescent mental disorders.

Indirect Costs

An appreciation of the indirect costs of childhood mental disorders is also important to an understanding of the economic burden of these disorders. Indirect costs are principally those related to lost earnings due to morbidity or premature death, and estimating them for children and adolescents is particularly difficult. For most age groups, the indirect costs associated with illness are the more significant component of costs. Thus, for example, it is relatively easy to estimate how much a 30-year-old worker would have earned had he or she not been hospitalized. For children and adolescents, lost schooling and developmental delays do have future costs, but these are usually difficult to quantify.

Cost to the Family

Finally, it should be noted that the intangible social costs of child and adolescent mental disorders are not included in estimates of direct or indirect costs. The latter do not include, for example, the impact of the disorder on other members of the family. In the case of some severe disorders, it is necessary for a potential wage earner to stay home to care for the child, and the family life of siblings and others revolves around the needs of the disabled child.

A key difference between children and adults is the extent to which families must bear the financial brunt of costly illnesses. Most families elect to keep even the most seriously disabled child at home as long as they can, and even those who feel ill equipped for the responsibility may find they have no real choice. For example, Birenbaum and Guyot (1988) recently described a survey of families with an autistic child. They found that, despite the severity of the disorder and the degree of impairment of the child, autistic children were less likely than other children to be covered by private health insurance; for those covered, insurers often provided no or markedly limited coverage.

Conclusion

The burden of illness for the child, the family, and society is difficult to quantify, largely because the information needed to calculate personal and social costs has not been collected. Moreover, even the direct costs of treating childhood mental disorders proved to be impossible for the committee to estimate with confidence. Although the committee was able to obtain mental health care cost estimates for children 18 and under from a regional analysis of treatment costs done specifically for this study, and for children 14 and under from a forthcoming national study, such estimates cannot support definitive statements on the direct treatment costs of these disorders. It is

not possible to generalize beyond the sample for the regional data, and the national estimates do not include most of the costs associated with treating 15- to 18-year-olds.

Estimating direct treatment costs is difficult because available data are not arrayed in relevant age categories for either mental health care or general health care. Existing national data on mental health care costs, and on many other aspects of health care, are subdivided for "children" under age 15, with older adolescents classified as young adults--an age break that does not fit well with conventional views of childhood. Much more meaningful subdivisions would be prepubertal children, perhaps to age 10 or 11, and adolescents age 11 to 18. Detailed data for each year would be even more appropriate, so investigators could combine relevant age clusters as necessary.

The increasingly precise cost estimates becoming available for adult mental disorders strongly suggest that similar information could be gathered for children; however, gathering data on childhood mental disorders presents special problems. More detailed health services research on which children with mental disorders are being treated, by whom, and where; of insurance coverage patterns and their effects on treatment; of the immediate and long-term effects of displacing health care costs onto families; and of other aspects of costs would provide a much-needed context for decisions about the care of the nation's mentally ill children.

RESEARCH PROGRESS

Knowledge about classification, course, and outcome of the mental disorders that afflict children has grown considerably over the past decades. Clinical researchers, often with special training in epidemiology, have been in the forefront of this effort, but much work remains to be done in defining and assessing these conditions, characterizing their natural history, identifying risk factors, and delineating variables of prognostic importance.

Classification

An adequate classification system is a prerequisite for advances in all areas of investigation of child and adolescent mental disorders. The system must be reliable enough that different investigators can assign the same children to the same diagnostic category. Scientific communication concerning these conditions is impossible otherwise. In addition, the classification system must be valid. Each category should be discrete, and when children are placed in a particular category it should convey information not only about the symptoms of the children in question, but also about the etiology, natural history, and response to treatment of their disorder.

Two general approaches are currently being taken to the classification of childhood mental disorders. One, termed the clinical-categorical method, is based on clinicians' judgments about what groups of symptoms constitute specific disorders. Two examples of this approach are the DSM-III-R (American Psychiatric Association, 1987) and the International Classification of Diseases (ICD-9-CM; Commission on Professional and Hospital Activities, 1978). In the former, committees have developed lists of descriptive criteria to define diagnostic categories. A disorder is defined mainly in terms of the list of features plus a cutoff that specifies the number of these features that must be present to justify a diagnosis. In the ICD-9-CM, narrative descriptive definitions of disorders were developed on the basis of input from mental health professionals throughout the world. The ICD-10 (which is now nearly complete) follows an approach similar to DSM-III-R in that it offers explicit diagnostic criteria.

The second general approach, called the empirical-statistical model, derives syndromes from multivariate analyses of data on large samples of children receiving care (Achenbach, 1985; Quay, 1986). Syndromes are determined by scoring the number and intensity of descriptive features (or "symptoms") reported for a child. The empirically derived syndromes can also be used as a basis for identifying specific categories of disorders by specifying the cutoff scores that have been found to discriminate effectively between children receiving care versus those in the general population. When cutoff scores are used to make categorical distinctions between the normal and clinical ranges, this empirically derived model becomes structurally similar to the categorical format of the DSM-III-R.

Analyses of data on more than 8,000 children have replicated several empirically derived syndromes, most of which have approximate counterparts in DSM-III-R diagnostic categories (Achenbach, Connors, Quay, Verhulst, and Howell, 1989). Research has also shown consistencies between empirically derived syndromes and quantified versions of some DSM syndromes (Edelbrock and Costello, 1988).

The complexity of childhood disorders is also reflected in the use of multiaxial systems of classifications, as in DSM-III (American Psychiatric Association, 1980) and DSM-III-R. These recognize that it is not sufficient to indicate simply the principal diagnosis. Clinicians are also called upon to identify developmental disorders and physical ailments, as well as to indicate the child's highest level of adaptive functioning and record the level of psychosocial adversity the child has been exposed to during the past year. In clinical practice--and in much research--special attention must be paid to the context in which a child's problem occurs. A classification system that focuses only on the child's symptomatology will not capture contextual variables (in the family or school environment, for example) that are so important in determining outcome.

Despite the differences in perspective sometimes adopted by clinicians and researchers, substantial progress has been made in developing reliable classification systems for child and adolescent mental disorders. None of the existing systems is wholly adequate, however. Some diagnostic groupings are well established and useful, while data on others are lacking. Continuing investment in the classification and measurement of disorders is needed in order to distinguish categories that are associated with specific etiologies, natural histories, and responses to treatment.

Assessment

Classification of disorders is closely tied to strategies used to assess the presence of disorders, and assessment is very much a matter of the available instrumentation. To advance efforts in this area it is necessary to understand the special challenges involved. These challenges stem to a large extent from the relative newness of research designed to identify childhood disorders. The following factors represent distinctive problems in assessing these disorders in children.

1. The extent to which children manifest clear-cut disorders of the sort implied by many adult diagnostic categories is not yet known, but there is increasing evidence that symptomatic pictures in children represent more complex entities than would be expected from a simple downward extrapolation of adult disorders. It is important that research distinguish among conditions that involve the following kinds of deviation from developmental expectations: (a) extreme versions of behavior that might be considered normal in less extreme degrees or at other ages; (b) a greater variety of problems than expected for the child's age and sex; (c) problem behavior across more situations than most children manifest; and (d) greater than average interference with development and competence.

2. Few children seek mental health services for themselves; rather, they are brought because adults decide that help is needed. Therefore, diagnostic assessment must include data from adult informants, such as parents and teachers.

3. Although parents, teachers, clinicians, and other observers can provide valuable and reliable data about children's functioning, the modest agreement found among informants indicates that no two informants are likely to provide exactly the same data (Achenbach, McConaughy, and Howell, 1987).

4. Because children are so dependent on their families, diagnostic assessment must take account of family stresses and issues.

Despite these problems in assessing children, considerable progress has been made in the measurement of child and adolescent psychopathology over the past decade. Comprehensive semistructured and structured interviews that are acceptably reliable have been developed, and screening instruments that are capable of discriminating between deviant and normal children have been standardized on large populations and are in widespread use. A random inspection of the journals reporting research on child mental disorders in the late 1970s would show that the use of standardized instruments was the exception; it is now the rule.

In a recent overview of diagnostic instruments for establishing rates of psychopathology in various groups of children, Gutterman, O'Brien, and Young (1987) reviewed five structured interview schedules. These are, in chronological order of their development, the lay-administered Diagnostic Interview for Children and Adolescents (DICA; Herjanic and Campbell, 1977; Herjanic, Campbell and Reich, 1982); the clinician-administered Kiddie-SADS for current psychopathology (K-SADS-E; Orvaschel, 1985); the lay-administered NIMH Diagnostic Interview Schedule for Children (DISC; Costello, 1983)-recently revised by Schaffer et al. (DISC-R; 1988); the clinician-administered Child Assessment Schedule (CAS; Hodges, Kline, Stern, Cytryn, and McKnew, 1982); and the clinician-administered Interview Schedule for Children (ISC; Kovacs, 1985b). These diagnostic instruments vary in organization, diagnostic coverage, and definition of concepts such as "current" and "severity." Considerable information is available on reliability and on discrepancies between parent and child reports. Data are lacking, however, on the usefulness or validity of the resulting diagnostic categories. Gutterman et al. (1987) concluded their review by recommending that these instruments not be viewed as discrete entities, but rather as containing sections that might be more or less relevant for different hypotheses.

A second approach that has enjoyed widespread use is that of symptom inventories. Many of these are available for assessing children in different age ranges. Richman's preschool behavior screening questionnaire (BSQ; Richman and Graham, 1971) was developed for three-year-olds and has been widely used in England and the United States. Several checklists have been developed for school-age children, including the Langner Scale (Langner, Gersten, McCarthy, and Eisenberg, 1976), the Conners Parent Rating Scale (Conners, 1970), the Conners Teacher Rating Scale (Conners, 1969), the Child Depression Inventory (CDI; Kovacs, 1985a), the Rutter Parent and Teacher forms (Rutter, 1967; Rutter et al., 1970), the Child Behavior Checklist

(Achenbach and Edelbrock, 1983), and the Perceived Competence Scale for Children (Harter, 1982). The latter instrument includes items reflecting both social competence and behavioral symptoms, and normative data for different age groups are available. Such instruments are particularly useful not only in screening children, but also in monitoring symptom changes.

Similar advances have been made in the development of specialized assessment techniques for monitoring the natural history of specific disorders and determining the efficacy of treatment. Examples include the Children's Psychiatric Rating Scale (Fish, 1985), the revised Children's Depression Rating Scale (Poznanski et al., 1984), the Childhood Autism Rating Scale (Schopler, Reichler, and Renner, 1985), and the Tourette's Syndrome Global Scale (Harcherick, Leckman, Detlor, and Cohen, 1984).

In addition to improvements in the measurement of symptoms and disorders, there have been advances in the measurement of other aspects of the child's life. Examples include a semistructured interview measuring social adjustment, which is designed to be completed by a child or adolescent as a self-report or by a parent about a child (John, Gammon, Prusoff, and Warner, 1987), and a questionnaire to be completed by teachers which focuses on the social behavior of pupils (Weir and Duveen, 1981).

RESEARCH RECOMMENDATIONS

A diversified portfolio of research initiatives is needed not only to expand the body of scientific knowledge about mental disorders of childhood, but also to heighten society's awareness of these disorders and the enormous social costs they entail. Some of the most pressing needs are: (1) broad methodological studies of some of the most vexing problems of classification, case definition, integration of data from multiple informants, and assessment of young children; (2) efforts to develop an accurate, up-to-date community prevalence database on these disorders; (3) innovative studies of risk and protective factors as they relate to specific disorders; (4) research on the prevention of violent behavior; and (5) research centers in child psychiatric epidemiology.

Improved Methodology

Three measurement problems that require the immediate attention of researchers in child mental health are (1) lack of knowledge about factors that influence respondents' judgments of emotional and behavior problems of children; (2) low agreement among informants; and (3) the difficulties associated with assessment of young children.

Reports of persons important in the child's life, such as parents and teachers, are valuable sources of information in assessing the child; however, data on variables that affect the responses of these persons are lacking, and there is a need to evaluate the usefulness of information provided by informants in different contexts.

Parents' reports are a much-relied-upon element in assessing the child, and they are essential for assessing observable behavior that varies across situations or that is not public. Many features of child psychopathology meet these criteria. A major issue is to what extent parental psychopathology affects the reports of parents about their child's behavior. It has been found that disturbed parents tend to report higher levels of child psychopathology (McGee, Silva and Williams, 1983). There is some evidence, for example, that previously depressed parents are more in tune with mood changes in their children and that their evaluations of mood more closely match their children's self evaluations (Angold et al., 1987). It could be, however, that symptoms in both the parent and the child may reflect the action of a third factor (genes or environment). Data are clearly needed about the magnitude of the effects of parental psychopathology on the reporting practices of parents and the mechanisms involved in producing these effects.

Other issues are reflected in findings that retrospective data provided by parents are often unreliable, that fathers tend to report less disorder than do mothers, and that parents are generally poor at describing their own behavior, particularly aspects of parenting behavior that are contingent upon the child's behavior (Earls, 1980; Block, Block, and Gjerde, 1988). Newer assessment instruments for parents employ more structured, concrete procedures, such as diaries and Q-sorts (Block et al., 1988). Awareness of these strengths and limitations is essential for the selection, downward extension, or development of assessment tools, and research in this area needs to be encouraged.

Child assessment methods used in research rely more heavily than adult methods on information from multiple informants, typically the child's parents, teacher, and the child himself or herself. Yet many studies show poor agreement among informants (Gould, Wunsch-Hitzig, and Dohrenwend, 1980). These differences may arise because the behavior is situation-specific, because parents and children may have different attitudes toward reporting things that reflect badly on the child, because parents and children differ in their understanding of behavioral terms, and because parents and teachers differ in their experience of normative behavior and, as a result, in their determination of abnormality.

Strategies for dealing with these problems include: (1) melding information, that is, giving value to any positive rating, regardless of source; (2) giving priority to the child's report of internal mood

and the parent's report of behavior problems; (3) avoiding any hierarchical judgment, instead assigning a confidence rating to each behavior proportionate to the amount of agreement among observers; and (4) considering disorders as informant-specific and not attempting to combine reports from different informants and sources into one diagnosis. There are advantages and disadvantages to each of these methods, but there is a need for considerably more research in this area.

The assessment of psychopathology in the young child (under age 10) is important for the field of child psychiatry because there is evidence that a number of significant disorders are first manifested during this period. Although a thorough range of instruments is available for measuring cognition, intelligence, and language, there are relatively few adequate methods available to assess psychopathology or socioemotional functioning (Achenbach, 1988; Harter, 1982).

The young child's limited expressive and receptive language abilities, immature grammar, inability to map events in time, limited powers of abstraction, and restricted vocabulary persist in some form through the age of seven. Given these limitations, there is a real question about whether the young child's self-perceptions, memories, feelings, and reported behavior can be reliably assessed through self-report. At this age, children may not understand words denoting complex internal states such as "believe" or "wish"; they may misidentify temporal sequences and associated causal linkages that are crucial in the evaluation of the adult or adolescent. All of this can be expected to influence the young child's capacity to anchor symptoms in time (duration), to express accurately their severity or frequency, and to arrive rationally at a cause-and-effect interpretation. Limited studies on the use of interview techniques among children under the age of 11 show that their replies are unreliable (Achenbach et al. 1987). This finding poses a challenge to instrument development, because although other observers (parents, teachers, or researchers) may accurately describe a child's external behavior, they may be oblivious to the child's perceptions, emotional reactions, and feelings (Harter, 1982).

Direct observation, which obviates some of the problems of reporter bias, is very popular among persons studying young children. In a review of studies of behavioral assessment of children, Bornstein, Bridgewater, Hickory, and Sweeney (1980) found that over 70 percent of studies made use of direct observation. Barton and Ascione (1984) suggest that observation is especially useful with very young children and for problems where the contextual determinants of the child's moods and actions (usually maternal behavior) are of interest. This technique poses many problems, however. First, it does not address, any more than a parent or teacher report can, the assessment of the child's subjective state. From a practical point of view, decoding and rating videotapes is a slow and expensive process.

There are few data on the reliability or short-term stability of direct observations, which are obviously sensitive to short-term changes in state, and these problems are probably reflected in the finding of generally poor agreement between direct observation of child behavior and parental report (Mash and Terdal, 1981). For these reasons it is important that priority be given to measurement research that will allow the investigator to obtain and code, systematically and reliably, subjective information directly from younger children. Direct evaluation of the mental status of the young child should not be written off as beyond current technology. It is a common experience that the emotions, perceptions, and reflections of a young child can be discerned by adults with surprising sensitivity and accuracy. However, the task of transferring these observations into a reliable methodology remains.

Development of a Community Prevalence Database

The long-awaited objective of providing a comprehensive and detailed picture of the prevalence of adult mental disorders in the community has been achieved through the NIMH Epidemiologic Catchment Area study (Eaton et al., 1986). The success of this coordinated, multisite study has gone far beyond expectations. Not only has it produced precise estimates of the prevalence of specific mental disorders for various geographic areas in the United States, but it is having a major impact on the development of classification schemes and methods of diagnosing adult mental disorders throughout the world. This landmark project presents an imposing model for studying the scope and magnitude of mental disorder in children over the next decade.

Because research on child mental disorders has not reached the level of scientific maturity attained by research on adult disorders, launching a large-scale community prevalence study of child mental disorders similar to the ECA would present special challenges. Several of these have been outlined already (the changing definitions of what is normal and abnormal as children develop, the problem of resolving discrepancies among informants, and the limited capacity to assess young children directly), but none is more important than case identification. Two critical problems are unresolved: (1) the extent to which children identified in community surveys represent true clinical cases, and (2) the degree to which identified children or their parents would accept services if they were offered. Implicit in both questions is a concern about the extent of agreement between research-driven definitions of disorder and the perceptions of illness held by parents, teachers, and children themselves.

To review the most current thinking on these and other issues in large-scale survey work, several investigators* actively involved in conducting community prevalence studies were contacted and asked a series of questions about problems inherent in the case identification techniques used in their projects. Each described the prevalence, duration, familial aggregation, and associated impairments of child mental disorders in his or her current studies. In addition, the researchers provided information on the need for treatment and utilization of services among children identified as having a disorder. Their responses were helpful in reviewing methodologies currently used in child psychiatric epidemiology and in evaluating the preparedness of the field for a large-scale, multisite community prevalence study. After these ongoing studies are completed, in the next few years, several important issues will remain to be addressed. The most salient of them are discussed below.

First, the relationship between symptoms and impairment is in need of clarification. Of particular interest is the need to calibrate the number and severity of symptoms against associated impairments. It is commonly thought that symptoms of a disorder lead to impairments and that there is a direct relationship between severity in one and the other. Yet it is possible for children with many symptoms to have minimal impairment (to maintain good school performance, for example) and for significantly impaired children to have few symptoms.

Second, concerns and uncertainty remain about the duration of specific disorders. Currently, information is often insufficient to predict when a disorder in a child will persist or when it will remit spontaneously.

Third, it is important to determine the extent to which certain disorders that appear to be very similar are indeed discrete conditions. This applies both to the disruptive behavior disorders and the anxiety disorders covered in DSM-III-R.

Fourth, more data are needed on comorbidities in order to clarify the extent to which these phenomena reflect the expression of multiple risk factors versus inadequate definition of syndromes.

There are other scientific goals that should be incorporated into the design of a large-scale, multisite prevalence study. The most important of these is a comprehensive assessment of the risk factors associated with specific disorders. Parental mental disorder is one of the most important of these risks. Research using clinical samples

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* The investigators contacted were David Offord, McMaster University; Patricia Cohen, Columbia University; Hector Bird, Columbia University; Terrie Moffitt, University of Wisconsin; Gwendolyn Zahner, Yale University; and Thomas Achenbach, University of Vermont.

indicates that some types of disorders aggregate in families. An examination of the familial clustering of parent and child disorders as a component of a community prevalence study would be an important contribution to research; however, it would require interviewing parents about themselves as well as about their children. Thus a large-scale community-based study of children would be more complex and expensive than a comparable study of adults.

Other indicators of risk should be considered. Some would be useful in identifying high-risk segments of the population for further study (for example, children whose parents are on welfare and children in foster care), while others would be important because of their contributing role in causing disorders (for example, the presence of marital discord, harsh and inconsistent discipline, head injury, or drug use). Such studies could identify modifiable conditions that might be included in preventive intervention trials.

A major, population-based epidemiological study of child mental disorders has the unique ability to address these issues. Neither of the two main alternatives--namely, studies of children receiving care or population-based symptom studies--is suitable. Clinic-based studies may introduce unsystematic distortions, such as parental morbidity or comorbidity. Symptom-based studies, no matter how excellent their sampling frames or techniques, do not address the diagnostic entities of central concern to clinicians.

Two initial steps should be taken in preparing for a large-scale, multisite community prevalence study. First, the goals should be made explicit. They would include scientific goals, some of which have been outlined above. Others could be specified, such as data on the course of disorders; this would necessitate the introduction of a longitudinal component to the study. Such a study should also address selected administrative or policy issues. Examples of these include a determination of the need for different types of services for the diagnosis and treatment of child mental disorders. Any regional differences in need could also be identified. Further, the usefulness in needs assessment of social indicators collected routinely in the census (for example, economic and family status) could be explored. The goal would be to show that these readily available data can be used successfully in estimating the need for children's mental health services (National Institute of Mental Health, 1988). Such information would have implications for future monitoring of the need for services by children with mental disorders.

The second step that should be taken before a multisite, community prevalence study is launched is preparatory studies using the assessment instruments. One strategy would be to conduct one or more multisite case-control studies. In these studies cases would be selected from a child mental health service, and the controls would be randomly selected from the same community. If several centers were

involved and the patient groups were sufficiently large, the results should be useful in addressing all of the issues mentioned above. Since this country has no tradition of carrying out case-control studies using rigorous standards of research design and assessment in child mental health research, this strategy is scientifically prudent, for a number of reasons. Combining a clinically referred sample and a control group representative of the general population from which the clinical sample had been drawn would be useful in estimating the types of biases influencing help-seeking. Estimates of base rates for the most common disorders could be made from the controls, while the adequacy of assessment instruments for measuring disorders, associated impairments, and correlated risk factors could be determined for children attending clinics for treatment. Comparisons between cases and controls on these measures would help clarify the factors distinguishing children in treatment from those needing care but not receiving it.

A coordinated, multisite epidemiological study of children's mental disorders would provide important information, national in scope, on service needs, and it would ensure wider recognition of the importance of the field of children's mental disorders. However, the committee believes that any move toward a national prevalence study should be taken in small, well-reasoned steps, which in themselves will yield scientifically valuable information and practical knowledge that could be useful in planning future service needs. Thus, community prevalence studies, conducted in several locations throughout the country, would be more appropriate at this time to develop the methods and procedures necessary to the future implementation of a large scale multisite study in this area. If one large-scale epidemiological study were to be done prematurely at the expense of other much-needed preparatory research, it would be a disservice to the field.

Research on Risk and Protective Factors

It should also be emphasized that identification of risk factors and protective factors and the mechanisms by which they produce their effects are extremely important goals. Such research requires measures that are as reliable and valid as the measures for psychopathology. Although a detailed discussion of the status of instruments for assessing risk factors is beyond the scope of this chapter, it should be noted that the assessment of risk factors is at the same preliminary phase of development as diagnostic instruments in this area.

Research on Antisocial and Violent Behavior

Among young Black Americans between the ages of 15 and 24, more deaths result from homicide than any other cause, including

unintentional injuries (accidents), suicide, heart disease, and cancer (Gulaid, Onwuachi-Saunders, Sacks, and Roberts, 1988). Further, homicide rates for young Black males are 5.5 times those for White males in the same age group. Few public health problems are more urgent. Epidemiological studies of homicide and community-based trials of interventions designed to reduce violent behavior lag far behind efforts in other areas. NIMH should be encouraged to augment efforts to stimulate and support research on the prevention of violence.

Establishment of Centers in Child Psychiatric Epidemiology

The establishment of federally supported research centers in child psychiatric epidemiology would be an important strategy to advance knowledge and training. Such centers would be places where issues related to the scope and magnitude of mental disorders in children and adolescents were addressed from a public health perspective. This perspective includes a concern for how policies are determined and evaluated, measurement of the direct and indirect costs of child and adolescent mental disorders, and use of epidemiological strategies to investigate the prevalence and determinants of illness. Such centers would be expected to increase the number of public health administrators and scientists who are committed to improving the care and treatment of children with mental disorders.

Centers could sponsor research on a variety of problems, including comparisons of different nosologies, development and field testing of new assessment methodologies useful in community settings, and prevalence and incidence studies of mental disorder in special population groups (for example, children in foster care and children exposed to catastrophic events with community-wide impact). Such centers would naturally become sites for the preparation and execution of a large-scale, multisite, community prevalence study. A number of problems involved in implementing and sustaining community studies could also be examined at such centers, for example: finding hard-to-reach subjects; developing community support for a research endeavor; telling the community about a study's progress; and translating the results of epidemiological studies into statements and material useful to policymakers. As different samples of children are assessed in the course of the work of these centers, the foundation should be laid for prospective and longitudinal studies to examine the continuities and discontinuities from child to adolescent to adult mental disorders.

Often, persons who are effective in conceiving and carrying out innovative intervention projects are not equipped to evaluate them. They require assistance from professionals in the design and execution of evaluation studies. Such evaluation is essential to the maintenance or extension of projects. The committee, therefore,

proposes that program directors from the most promising community-based intervention programs across the country be convened by NIMH to meet with epidemiologists and skilled evaluators to consider jointly means of incorporating assessment into existing programs and programs now on the drawing boards.

NOTE

1. In a comprehensive review of epidemiological studies conducted prior to DSM-III, Gould and colleagues (1981) found that the median rate of "maladjustment" among children in the general population was 11.8 percent. With the advent of a more detailed system for classifying mental disorders, developed by the American Psychiatric Association (DSM-III; 1980), several descriptive epidemiological studies have been conducted using structured diagnostic interview schedules or checklists designed specifically to elicit information needed for making formal diagnoses according to the DSM-III criteria. Costello (in press-a) recently reviewed five such studies conducted in a variety of settings and found that 17 to 22 percent of children were diagnosed with one or more disorders. Table 2-2 provides selected data from these preliminary studies.

It is difficult to interpret the significance and treatment implications of these rates, because the existing studies do not always contain large, representative samples or detailed longitudinal information on symptom severity, duration, and degree of social or scholastic impairment. In addition, it should be emphasized that these global rates, and the rates of specific disorders presented below (and in Table 2-2), reflect DSM-III's cutoffs and thresholds that determine the presence or absence of a disorder. The validity of these thresholds has not been established (Offord, in press), and any raising or lowering of them will alter the rates accordingly.

Several epidemiological studies have provided information on the prevalence of specific types of psychiatric disorders. It should be noted that such rates cannot be added to reach a total prevalence count because many disorders may occur together in the same child. For example, autism and severe mental retardation often coexist (Bryson, Clark, and Smith, 1988), as do conduct disorder and attention-deficit disorder (Sandberg et al., 1980) and major depression and alcohol abuse (Deykin, Levy, and Wells, 1987). In an epidemiological

study of children in Puerto Rico (Bird et al., 1988), almost half of the children with diagnosable disorders had two or more domains of psychopathology. Similarly, in an untreated sample of 28 adolescents meeting criteria for a DSM-III diagnosis, Kashani et al. (1987) found an average of 2.4 diagnoses per child (with a range of one to four). Thus the high level of comorbidity must be considered in drawing inferences from the rates presented below.

The most extensive community prevalence data are available on autism, conduct disorder, attention-deficit disorder with or without hyperactivity, depression, and anxiety disorders. With respect to autism, Bryson et al. (1988) conducted a total population screening in a region of Nova Scotia, Canada, and reported a prevalence rate of 10 per 10,000. This rate is considerably higher than those reported in early studies, which ranged from 2 to 5 per 10,000 (Smalley, Asarnow, and Spence, 1988), and may reflect a broadening of diagnostic criteria. The male-female ratio in the Canadian sample was 2.5 to 1, and 75 percent of the children were deemed mentally retarded.

Conduct disorder and attention-deficit disorder are two important behavioral categories delineated in DSM-III. The rate of conduct disorder in the five studies included in Table 2-2 ranges from 1.5 percent in a Puerto Rican sample of 4- to 16-year-olds to 5.5 percent in a Canadian sample of 4- to 16-year-olds (Costello, in press-a). The rates are considerably higher in boys than in girls and increase with age. For example, in the study by Offord and colleagues (Offord, Boyle, Szatmari, et al., 1987), the rate of conduct disorder in boys 4 to 11 was 6.5 percent, compared to 10.4 percent in 12- to 16-year-old boys. The rates for girls were 1.8 percent and 4.1 percent in the two age groups, respectively.

The rate of attention-deficit disorder with and without hyperactivity in the five studies ranges from 2.2 percent in a sample of 7- to 11-year-olds selected from a primary medical care setting in western Pennsylvania (Costello, in press-b) to 9.9 percent in the Puerto Rican sample noted in Table 2-2 (Bird et al., in press). This disorder is also more common in boys than in girls. In the Offord, Boyle, Szatmari, et al. study (1987), the rate of hyperactivity was somewhat higher in younger than in older boys, but no age effect was found in girls. It is important to note that the diagnoses of conduct disorder and attention-deficit disorder frequently overlap. Furthermore, many children with conduct disorder meet diagnostic criteria for substance abuse (Newcombe, Maddahian, and Bentler, 1986).

The disorders of depression and anxiety have also received increasing attention by the research community. Although most studies of depression have focused on depressive symptomatology in adolescents, several recent studies have examined the prevalence of major depressive disorder using a structured diagnostic approach. The rates range from less than 1 percent to 2.7 percent in preadolescent populations, and 3.7 (current) to 8.3 percent (lifetime) in postpubescent groups (Fleming, Offord, and Boyle, in press). Rates have been presented separately for the various subtypes of anxiety disorder. According to Costello (in press-a) (see Table 2-2), separation anxiety rates range from 3.5 to 5.4 percent, overanxious disorder rates range from 2.7 to 4.6 percent, and simple phobia rates range from 2.3 to 9.2 percent. In most studies, the prevalence rates for depression and anxiety tend to be higher in girls than in boys during adolescence. This difference appears to be absent or reversed in childhood (Angold, 1988). Separation anxiety and phobic anxiety decrease with age, whereas more generalized anxiety and depression increase with age.

A discussion of prevalence would be remiss without comment on two issues of grave public health concern: the tripling of the adolescent suicide rate among White males in the last three decades (Rosenberg et al., 1987) and the high homicide rate among young Black males (Gulaid et al., 1988). Suicide among adolescents is currently the second leading cause of death in that age group. Among young people age 15 to 24, the rate increased from 2.6 per 100,000 in 1955 to 8.5 per 100,000 in 1980, with firearms being the most common method. The highest rate occurs among White males. The issue of comorbid mental disorders is especially important, because most suicide victims suffer from depression or substance abuse, or both, and many come from families with a history of depression and suicide. Among Black youth, more lives are lost to homicide than any other cause of death. Homicide rates for young Black males are 5.5 times those for White males in the same age group.

References

Achenbach, T. M. (1985). Assessment and Taxonomy of Child and Adolescent Psychopathology. Newbury Park, CA: Sage.

Achenbach, T. M. (1988). Integrating assessment and taxonomy. In M. Rutter, A. H. Tuma, & I. Lann (Eds.), Assessment and diagnosis in child and adolescent psychopathology (pp. 300-343). New York: Guilford Press.

Achenbach, T. M., Conners, C. K., Quay, H. C., Verhulst, F. C., & Howell, C. T. (1989). Replication of empirically-derived syndromes as a basis for taxonomy of child/adolescent psychopathology. Journal of Abnormal Child Psychology, 17, 299-323.

Achenbach, T. M., & Edelbrock, C. S. (1983). Manual for the child behavior checklist and revised child behavior profile. Burlington, VT: University of Vermont, Department of Psychiatry.

Achenbach, T. M., McConaughy, S. H., & Howell, C. T. (1987). Child/adolescent behavioral and emotional problems: Implications of cross-informant correlations for situational specificity. Psychological Bulletin, 101(2), 213-232.

Allen, R. E., & Oliver, J. M. (1982). The effects of child maltreatment on language development. Child Abuse and Neglect, 6, 299-305.

Alperstein, G., Rappaport, C., & Flanigan, J. M. (1988). Health problems of homeless children in New York City. American Journal of Public Health, 78(9), 1232-1233.

American Psychiatric Association. (1980). Diagnostic and statistical manual of mental disorders (3rd ed.). Washington, DC: Author.

American Psychiatric Association. (1987). Diagnostic and statistical manual of mental disorders (3rd ed., rev.). Washington, DC: Author.

Anderson, J., Williams, S., McGee, R., & Silva, P. (in press). Cognitive and social correlates of DSM-III disorders in preadolescent children. Journal of the American Academy of Child and Adolescent Psychiatry.

Angold, A. (1988). Childhood and adolescent depression: I. Epidemiological and aetiological aspects. British Journal of Psychiatry, 152, 601-617.

Angold, A., Weissman, M. M., John, K., Merikangas, K. R., Prusoff, B. A., Wickramaratne, P., Gammon, G. D., & Warner, V. (1987). Parent and child reports of depressive symptoms in children at low and high risk of depression. Journal of Child Psychology and Psychiatry, 28(6), 901-915.

Barton, E. J., & Ascione, S. R. (1984). Direct Observation. In T. H. Ollendick & M. Hersen (Eds.), Child behavioral assessment: Principles and procedures (pp. 166-194). New York: Pergamon Press.

Bassuk, E. L., & Rosenberg, L. (in press). Psychosocial characteristics of homeless and housed children. Pediatrics.

Beardslee, W., Son, L., & Vaillant, G. (1986). Exposure to parental alcoholism during childhood and outcome in adulthood: A prospective longitudinal study. British Journal of Psychiatry, 149, 584-591.

Bird, H., Canino, G., Rubio-Stipec, M., Gould, M. S., Ribera, J., Sesman, M., Woodbury, M., Huertas-Goldman, S., Pagan, A., Sanchez-Lacay, A., & Moscoso, M. (1988). Estimates of the prevalence of childhood maladjustment in a community survey in Puerto Rico: The use of combined measures. Archives of General Psychiatry, 45, 1120-1126.

Bird, H., Gould, M. S., Yager, T., Staghezza, B., & Canino, G. (in press). Risk factors for maladjustment in Puerto Rican children. Journal of the American Academy of Child and Adolescent Psychiatry.

Birenbaum, A., & Guyot, D. (1988). Health care for children with autism: Utilization, financing and expenditures. In P. Widem & M. Fishman (Eds.), Financing of mental health services for children and adolescents. Rockville, MD: National Institute of Mental Health and the Bureau of Maternal and Child Health and Resources Development.

Block, J., Block, J. H., & Gjerde, P. F. (1988). Parental functioning and the home environment in families of divorce: Prospective and concurrent analyses. Journal of the American Academy of Child and Adolescent Psychiatry, 27(2), 207-213.

Bornstein, P. H., Bridgewater, C. A., Hickory, J. S., & Sweeney, T. M. (1980). Characteristics and trends in behavioral analysis: Archival analysis. Behavioral assessment, 2, 125-133.

Bromet, E., Hough, L., & Connell, M. (1984). Mental health of children near the three mile island reactor. Journal of Preventive Psychiatry, 2, 275-301.

Bromet, E. J., & Schulberg, J. C. (1986). The Three Mile Island disaster: A search for high risk groups. In J. H. Shore (Ed.), Disaster stress studies: New methods and findings (pp. 2-19). Washington, DC: American Psychiatric Press.

Brown, G., Chadwick, O., Shaffer, D., Rutter, M., & Traub, M. (1981). A prospective study of children with head injuries: III. Psychiatric sequelae. Psychological Medicine, 11, 63-78.

Bryson, S., Clark, B., & Smith, I. (1988). First report of a Canadian epidemiological study of autistic syndromes. Journal of Child Psychology and Psychiatry, 29, 433-445.

Cadman, D., Boyle, M. H., Offord, D. R., Szatmari, P., Rae-Grant, N. I., Crawford, J., & Byles, J. (1986). Chronic illness and functional limitations in Ontario children: Findings of the Ontario child health study. Canadian Medical Association Journal, 135, 761-767.

Cadman, D., Boyle, M. H., Szatmari, P., & Offord. D. (1987). Chronic illness, disability, and mental and social well-being: Findings of the Ontario child health study. Pediatrics, 79, 805-813.

Campbell, M. (1987). Drug Treatment of infantile autism: The past decade. In H. Y. Meltzer (Ed.), Psychopharmacology: The third generation of progress (pp. 1225-1231). New York: Raven Press.

Campbell, M., & Schopler, E. (1989). Pervasive developmental disorders. In T. B. Karasu (Ed.), Treatments of psychiatric disorders. Washington, DC: American Psychiatric Press.

Christie, K. A., Burke, J. D., Reiger, D. A., Rae, D. S., Boyd, J. H., & Locke, B. Z. (1988). Epidemiologic evidence for early onset of mental disorders and higher risk of drug abuse in young adults. American Journal of Psychiatry 145(8), 971-975.

Cohen, D. J. & Donnellan, A. M. (Eds.). (1987). Handbook of autism and pervasive developmental disorders. New York: John Wiley & Sons, Inc.

Commission on Professional and Hospital Activities. (1978). The International Classification of Diseases, 9th Revision, Clinical Modification [ICD-9-CM]. Ann Arbor, MI: Author.

Conners, C. K. (1969). A teacher rating scale for use in drug studies with children. American Journal of Psychiatry, 126, 152-156.

Conners, C. K. (1970). Symptom patterns in hyperkinetic, neurotic, and normal children. Child Development, 41, 667-682.

Costello, A. (1983). A report on the NIMH diagnostic interview schedule for children (DISC). Paper presented at the Research Forum: Structured Instruments in Child Psychiatry, Annual Meeting of the American Academy of Child Psychiatry, San Francisco, CA.

Costello, E. J. (in press-a). [Special Introduction] Developments in child psychiatric epidemiology. Journal of the American Academy of Child and Adolescent Psychiatry.

Costello, E. J. (in press-b). Child psychiatric disorders and their correlates: A primary care pediatrics sample. Journal of the American Academy of Child and Adolescent Psychiatry.

Deykin, E. U., Levy, J. C., & Wells, B. (1987). Adolescent depression, alcohol and drug use. American Journal of Public Health, 77, 178-182.

Earls, F. (1980). The prevalence of behavior problems in three-year-old children: Comparison of the reports of fathers and mothers. Journal of the American Academy of Child Psychiatry, 19, 439-452.

Earls, F., & Jung, K. G. (1987). Temperament and home environment characteristics as causal factors in the early development of childhood psychopathology. Journal of the American Academy of Child and Adolescent Psychiatry, 26, 491-498.

Earls, F., Reich, W., Jung, K. G., & Cloninger, C. R. (1988). Psychopathology in children of alcoholic and antisocial parents. Alcoholism: Clinical and Experimental Research, 12, 481-487.

Eaton, W. W., Regier, D. A., Locke, B. Z., & Taube, C. A. (1986). The NIMH epidemiologic catchment area program. In M. M. Weissman, J. K. Myers, & C. E. Ross (Eds.), Community surveys of psychiatric disorders (pp. 209-219. New Brunswick, New Jersey: Rutgers University Press.

Edelbrock, C., & Costello, A. J. (1988). Convergence between statistically derived behavior problem syndromes and child psychiatric diagnoses. Journal of Abnormal Child Psychology, 16, 219-231.

Education for All Handicapped Children Act, Pub. L. No. 94-142, 89 Stat. 774, 775 (1975).

Fish, B. (1985). Methodology in child psychopharmacology. In D. H. Efrom, J. O. Cole, J. Levine, & J. R. Wittenborn (Eds.), Psychopharmacology: A review of progress 1957-1967 (PHS Publication No. 1836, pp. 989-1001). Washington, DC: U.S. Government Printing Office.

Flanagan, T. J., & Jamieson, K. M. (Eds.) (1988). Sourcebook of Criminal Justice Statistics - 1987. U.S. Department of Justice, Bureau of Justice Statistics. Washington, DC: U.S. Government Printing Office.

Fleming, J. E., Offord, D. R., & Boyle, M. H. (in press). Ontario child health study: Prevalence of childhood and adolescent depression in the community. British Journal of Psychiatry.

Garmezy, M. (1985). Stress-resistant children: The search for protective factors. In J. E. Stevenson (Ed.), Recent research in developmental psychopathology (pp. 213-233). Oxford: Pergamon Press. (Book Supplement No. 4 to the Journal of Child Psychology and Psychiatry.)

Gould, J., Wunsch-Hitzig, R., & Dohrenwend, B. P. (1980). Formulation of hypotheses about the prevalence, treatment, and prognostic significance of psychiatric disorders in children in the United States. In B. P. Dohrenwend, B. S. Dohrenwend, B. Link, R. Neugebauer, & R. Wunsch-Hitzig (Eds.), Mental illness in the United States (pp. 9-44). New York: Praeger Publishers.

Gould, M., Wunsch-Hitzig, R., & Dohrenwend, B. (1981). Estimating the prevalence of childhood psychopathology. Journal of the American Academy of Child Psychiatry, 20, 462-476.

Green, A. H., Voeller, K., Gaines, R., & Kubie, J. (1981). Neurological impairment in maltreated children. Child Abuse and Neglect, 5, 129-134.

Gulaid, J. A., Onwuachi-Saunders, E. C., Sacks, J. J. & Roberts, D. R. (1988). Differences in death rates due to injury among blacks and whites. Morbidity and Mortality Weekly Report, 37(3), 25-31.

Gutterman, E. M., O'Brien, J. D., & Young, J. G. (1987). Structured diagnostic interviews for children and adolescents: Current status and future directions. Journal of the American Academy of Child and Adolescent Psychiatry, 26, 621-630.

Harcherick, D. F., Leckman, J. F., Detlor, J., & Cohen, D.J. (1984). A new instrument for clinical studies of Tourette's syndrome. Journal of the American Academy of Child Psychiatry, 23(2), 153-160.

Harter, S. (1982). The Perceived Competence Scale for children. Child Development, 53, 87-97.

Harwood, H. J., & Napolitano, D. M. (1985). Economic implications of the fetal alcohol syndrome. Alcohol Health and Research World, 38-45.

Health Data Institute. (1988). Cost of mental illness treatment for children. An unpublished report to the Institute of Medicine, National Academy of Sciences. Lexington, MA: Baxter Healthcare Corporation, the Health Data Institute.

Herjanic, B., & Campbell, W. (1977). Differentiating psychiatrically disturbed children on the basis of a structured interview. Journal of Abnormal Child Psychology, 5, 127-134.

Herjanic, B., Campbell, W., & Reich, W. (1982). Development of a structured psychiatric interview for children: Agreement between child and parent on individual symptoms. Journal of Abnormal Child Psychology, 10, 307-324.

Hodges, R., Kline, J., Stern, L., Cytryn, L., & McKnew, D. (1982). The development of a child assessment interview for research and clinical use. Journal of Abnormal Child Psychiatry, 10, 173-189.

Hollingsworth, C. E., Tanguay, P. E., Grossman, L., & Pabst, P. (1980). Long-term outcome of obsessive-compulsive disorder in childhood. Journal of the American Academy of Child Psychiatry, 19(1), 134-144.

Institute of Medicine. (1985). Research on mental illness and addictive disorders: Progress and prospects. A report of the Board on Mental Health and Behavioral Medicine. American Journal of Psychiatry, 142(7, Suppl.), 1-41.

Institute of Medicine. (1988). Homelessness, health, and human needs. Washington, DC: National Academy Press.

John, K., Gammon, G. D., Prusoff, B. A., & Warner, V. (1987). Social adjustment inventory for children and adolescents (SAICA): Testing of a new semi-structured interview. Journal of the American Academy of Child and Adolescent Psychiatry, 26, 898-911.

Joint Commission on Mental Health of Children. (1969). Crisis in child mental health: Challenge for the 1970s. New York: Harper & Row.

Kandel, D. B., & Davies, M. (1982). Epidemiology of depressive mood in adolescents. Archives of General Psychiatry, 39, 1205-1212.

Kaplan, H. I., & Sadock, B. J. (1988). Synopsis of Psychiatry: Behavioral Sciences and Clinical Psychiatry (5th ed.). Baltimore, MD: Williams & Wilkins.

Kashani, J. H., Beck, N. C., Hoeper, E. W., Fallahi, C., Corcoran, C. M., McAllister, J. A., Rosenberg, T. K., and Reid, J. C. (1987). Psychiatric disorders in a community sample of adolescents. American Journal of Psychiatry, 144, 584-589.

Kazdin, A. E. (1989). Developmental Psychopathology: Current research, issues, and directions. American Psychologist, 44(2), 180-187.

Keane, A. (1983). Behavior problems among long-term foster children. Adoption and Fostering, 7, 53-62.

Knitzer, J. (1982). Unclaimed children. Washington, DC: Children's Defense Fund.

Kovacs, M. (1985a). The children's depression inventory (CDI). Psychopharmacological Bulletin, 21, 995-998.

Kovacs, M. (1985b). The interview schedule for children (ISC). Psychopharmacology Bulletin, 21(4), 991-994.

Kovacs, M. (1989). Affective disorders in children and adolescents. American Psychologist, 44(2), 209-215.

Kovacs, M., Feinberg, T. L., Crouse-Novak, M. A., & Paulauskos, S. A., Finkelstein, R. (1984). Depressive disorders in childhood: I. A longitudinal prospective study of characteristics and recovery. Archives of General Psychiatry, 41, 229-237.

Krupnick, J., & Solomon, F. (1987). Death of a parent or sibling during childhood. In J. Bloom-Feshbach & S. Bloom-Feshbach (Eds.), The psychology of separation and loss (pp. 345-371). San Francisco: Jossey-Bass.

Langner, T. S., Gersten, J. C., McCarthy, E. D., & Eisenberg, J. G. (1976). A screening inventory for assessing psychiatric impairment in children 6 to 18. Journal of Consulting and Clinical Psychology, 44, 286-296.

Lindsay, J., Ounsted, C., & Richards, P. (1979). Long-term outcome in children with temporal lobe seizures. Developmental Medicine and Child Neurology, 21, 630-636.

Lovaas, O. I. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. Journal of Consulting and Clinical Psychology, 55(1), 3-9.

Manderscheid, R. (1989). National Institute of Mental Health, Division of Biometry and Applied Sciences. Personal communication.

Mash, E. J., & Terdal, L. G. (Eds.). (1981). Behavioral assessment of childhood disorders. New York: Guilford Press.

May, P. (1987). Suicide and self-destruction among American Indian youth. Journal of American Indian and Alaska Native Mental Health Research, 1, 52-69.

Maziade, M., Caperaa, P., Laplante, B., Boudreault, M., Thivierge, J., Cote, R., & Boutin, P. (1985). Value of difficult temperament among 7-year-olds in the general population for predicting psychiatric diagnosis at age 12. American Journal of Psychiatry, 142(8), 943-946.

McGee, R. O., Silva, P. A., & Williams, S. M. (1983). Parents' and teachers' perceptions of behavior problems in 7-year-old children. Exceptional Child, 30, 151-161.

Moore, M. T., Strang, E. W., Schwartz, M., and Braddock, M. (1988). Patterns in special education service delivery and cost. Washington, DC: Decision Resource Corporation.

Mrazek, P. B., & Mrazek, D. A. (1981). The effects of child sexual abuse: Methodological considerations. In P. B. Mrazek & C. H. Kempe (Eds.), Sexually abused children and their families (pp. 235-245). Oxford: Permagon.

National Institute of Mental Health. (1988). Needs Assessment: Its future (DHHS Publication No. ADM 88-1550). Washington, DC: U.S. Government Printing Office.

Newcombe, M. D., Maddahian, E., & Bentler, P. M. (1986). Risk factors for drug use among adolescents: Concurrent and longitudinal analyses. American Journal of Public Health, 76, 525-531.

Nichols, P. L., & Chen, T. C. (1981). Minimal brain dysfunction: A prospective study. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Office of Technology Assessment (1986, December). Children's Mental Health: Problems and Services--A background paper (Publication No. OTA-BP-H-33). Washington, DC: U.S. Government Printing Office.

Offord, D. (in press). Conduct disorder: Risk factors and prevention. Washington, DC: Alcohol, Drug Abuse, and Mental Health Administration.

Offord, D. R., Alder, R. J., & Boyle, M. H. (1986). Prevalence and sociodemographic correlates of conduct disorder. American Journal of Social Psychiatry, 6, 272-278.

Offord, D. R., Boyle, M. H., and Jones, B. A. (1987). Psychiatric disorders and poor school performance among welfare children in Ontario. Canadian Journal of Psychiatry, 32, 518-525.

Offord, D. R., Boyle, M. H., Szatmari, P., Rae-Grant, N. I., Links, P. S., Cadman, D. T., Byles, J. A., Crawford, J. W., Munroe Blum, H., Byrne, C., Thomas, H., & Woodward, C. A. (1987). Ontario child health study: Six-month prevalence of disorder and rates of service utilization. Archives of General Psychiatry, 44, 832-836.

Offord, D. R., Boyle, M. H., & Racine, Y. (in press). Ontario child health study: Correlates of disorder. Journal of the American Academy of Child and Adolescent Psychiatry.

Orvaschel, H. (1985). Psychiatric interviews suitable for use in research with children and adolescents. Psychopharmacology Bulletin, 21, 737-745.

Osterweis, M., Solomon, F., & Green, M. (Eds.). (1984). Bereavement: Reactions, consequences and care. A report of the Institute of Medicine. Washington, DC: National Academy Press.

Patterson, G. R., DeBaryshe, B. D., & Ramsey, E. (1989). A developmental perspective on antisocial behavior. American Psychologist, 44(2), 329-335.

Poznanski, E. O. (1982). The clinical phenomenology of childhood depression. American Journal of Orthopsychiatry, 52(2), 308-313.

Poznanski, E. O., Grossman, J. A., Buchsbaum, Y., Banegas, M., Freeman, L., & Gibbons, R. (1984). Preliminary studies of the reliability and validity of the children's depression rating scale. Journal of the American Academy of Child Psychiatry, 23(2), 191-197.

President's Commission on Mental Health. (1978). Task panel reports submitted to the President's Commission on Mental Health (Vol. 4). Washington, DC: U.S. Government Printing Office.

Puig-Antich, J. (1982). Major depression and conduct disorder in prepuberty. Journal of the American Academy of Child Psychiatry, 21, 118-128.

Puig-Antich, J. (1984). Clinical and treatment aspects of depression in childhood and adolescence. Pediatric Ann., 13(1), 37-41, 44-45..

Puig-Antich, J., & Chambers, W. (1978). The schedule for affective disorders and schizophrenia for school-age children (Kiddie-SADS). New York: New York State Psychiatric Association.

Puig-Antich, J., Ryan, N., & Rabinovich, J., (1985). Affective disorders in childhood and adolescence. In J. M. Wiener (Ed.), Diagnosis and psychopharmacology of childhood and adolescent disorders. New York: John Wiley & Sons.

Quay, J. C. (1986). Classification. In H. C. Quay & Werry, J. S. (Eds.), Psychopathological disorders of childhood (3rd ed., pp. 1-34). New York: Wiley.

Rice, D. P., Kelman, S., & Dunmeyer, S. (in progress). The economic costs of alcohol and drug abuse and mental illness: 1985. Report to the Office of Financing and Coverage Policy (Alcohol, Drug Abuse and Mental Health Administration, U.S. Department of Health and Human Services). Institute for Health & Aging, University of California, San Francisco.

Richman, N., & Graham, P. (1971). A behavioral screening questionnaire for use with three-year-old children. Journal of Child Psychology and Psychiatry, 12, 5-33.

Robins, L. N. (1966). Deviant children grown up: A sociological and psychiatric study of sociopathic personality. Baltimore: Williams & Wilkins.

Robins, L. N. (1970). The adult development of the antisocial child. Seminars in Psychiatry, 6, 420-434.

Robins, L. N. (1974). Antisocial behavior disturbances of childhood: Prevalence, prognosis and prospects. In E. J. Anthony & C. Koupernik (Eds.), The child in his family: Children at psychiatric risk (pp. 447-460). New York: Wiley.

Rosenberg, M. L., Smith, J. C., Davidson, L. E., & Conn, J. M. (1987). The emergence of youth suicide: An epidemiologic analysis and public health perspective. The Annual Review of Public Health, 8, 417-440.

Rutter, M. (1967). A children's behavior questionnaire for completion by teachers: Preliminary findings. Journal of Child Psychology and Psychiatry, 8, 1-11.

Rutter, M. (1976). Institute of Psychiatry Department of Child and Adolescent Psychiatry. Psychological Medicine, 6(3), 505-516.

Rutter, M. (1984). Psychopathology and development: I. Childhood antecedents of adult psychiatric disorder. Australian and New Zealand Journal of Psychiatry, 18, 225-234.

Rutter, M. (1985). Resilience in the face of adversity: Protective factors and resistance to psychiatric disorders. British Journal of Psychiatry, 147, 598-611.

Rutter, M. (1987). Parental mental disorder as a psychiatric risk factor. In R. Hales & A. Frances (Eds.), American Psychiatric Association annual review, (Vol. 6, pp. 647-663). Washington, DC: American Psychiatric Press.

Rutter, M., Izard, C. E., & Read, P. B. (1986). Depression in young people: Developmental and clinical perspectives. New York: The Guilford Press.

Rutter, M., Tizard, J., & Whitmore, K. (1970). Education, Health and Behavior. London: Longman Press.

Rutter, M., Tizard, J., Yule, W., Graham, P., & Whitmore, K. (1976). Research report: Isle of Wight studies, 1964-1974. Psychologocal Medicine, 6(2), 313-332.

Ryan, N. D., Puig-Antich, J., Ambrosini, P., Rabinovich, H., Robinson, D., Nelson, B., Iyengar, S., & Twomey, J. (1987). The clinical picture of major depression in children and adolescence. Archives of General Psychiatry, 44(1), 854-861.

Sameroff, A. J., Seifer, R., Zax, M., & Barocas, R. B. (1987). Early indicators of developmental risk: The Rochester longitudinal study. Schizophrenia Bulletin, 13, 383-394.

Sandberg, S. T., Wieselberg, M., & Shaffer, D. (1980). Hyperkinetic and conduct problem children in a primary school population: Some epidemiological considerations. Journal of Child Psychology and Psychiatry, 21, 293-311.

Saxe, L., Cross, T., & Silverman, N., with Dougherty, D. (1987). Children's mental health: Problems and services. Durham, NC: Duke University Press. [Originally published in 1986 by the Office of Technology Assessment, U.S. Congress, Washington, DC: U.S. Government Printing Office.]

Schaffer, D., Schwab-Stone, M., Fisher, P., Davies, M., Piacentini, J., & Gioia, P. (1988). A revised version of the diagnostic interview schedule for children (DISC-R): Results of a field trial and proposals for a new instrument (DISC-2). Report submitted to the Division of Epidemiology and Biometrics, National Institute of Mental Health, Rockville, Maryland.

Schonfeld, I., Schaffer, D., O'Conner, P., & Portnoy, S. (1988). Conduct disorder and cognitive functioning: Testing three causal hypotheses. Child Development, 59, 993-1007.

Schopler, E., Reichler, R. J., & Renner, B. R. (1985). The childhood autism rating scale (CARS). New York: Irvington Publications.

Select Committee on Children, Youth, and Families. (1987, July 14). Children's mental health: Promising responses to neglected problems. Hearing before the Select Committee on Children, Youth, and Families, House of Representatives, One Hundredth Congress, First Session. Washington, DC: U.S. Government Printing Office.

Shaw, J. A. (1988). Childhood depression. Medical Clinics of North America, 72(4), 831-845.

Smalley, S., Asarnow, R., & Spence, A. (1988). Autism and genetics. Archives of General Psychiatry, 45, 953-961.

Stewart, A. (1983). Severe perinatal hazards. In M. Rutter (Ed.), Developmental Neuropsychiatry (pp. 15-31). New York: Guilford Press.

Stroul, B. A., & Friedman, R. M. (1986). A system of care for severely emotionally disturbed children & youth. Washington, D.C.: CASSP Technical Assistance Center.

Tienari, P., Sorri, A., Lahti, I., Naarala, M., Wahlberg, K. E., Moring, J., Pohjola, J., & Wynne, L. (1987). Genetic psychosocial factors in schizophrenia: The Finnish adoptive family study. Schizophrenia Bulletin, 13, 477-484.

Tennant, C. (1988). Parental loss in childhood. Archives of General Psychiatry, 45, 1045-1050.

Tuma, J. M. (1989). Mental health services for children. American Psycholgist, 44(2), 188-199.

Velez, C. N., Johnson, J., & Cohen, P. (in press). The children in the community project: A longitudinal analysis of selected risk factors for childhood psychopathology. Journal of the American Academy of Child and Adolescent Psychiatry.

Watt, N. F., Anthony, E. J., Wynne, L. C., & Rolf, J. E. (Eds.). (1984). Children at risk for schizophrenia: A longitudinal perspective. New York: Cambridge University Press.

Weissman, M., Gammon, D., John, K., Merikangas, K., Warner, V., Prusoff, B., & Sholomskav, D. (1987). Children of depressed parents: Increased psychopathology and early onset of major depression. Archives of General Psychiatry, 44, 847-853.

Weir, K., & Duveen, G. (1981). Further development and validation of the prosocial behaviour questionnaire for use by teachers. Journal of Child Psychology and Psychiatry, 22(4), 357-374.

CHAPTER 3

CAUSES AND DETERMINANTS

Mental, behavioral, and developmental disorders frequently preclude children from functioning effectively at home, at school, or in their social and work environments. Sometimes these disorders cause life-threatening disruptions, as in the case of depressed and suicidal adolescents. If the burden of suffering of affected children is to be diminished, and if progress is to be made in reducing the incidence and prevalence of these disorders, their causes and determinants must be elucidated.

The modern conceptual framework for the etiology of these disorders emphasizes their diversity and complexity, focuses on the importance of the developmental processes associated with growth and maturation, and underscores the valuable contributions that have been and will continue to be made by many different scientific disciplines. The study of childhood disorders has profited from knowledge about adult psychopathology, but it is more than simply a downward extension of research on adult mental disorders. Given the remarkable changes that transpire between birth and maturity, research into the causes and determinants of the disorders of children requires a developmental perspective. This approach takes into account the emerging behavioral repertoire, cognitive and language functions, and social and emotional processes, as well as changes in anatomical structures and in the physiological processes of the brain.

Advances in both neuroscience and human genetics, which only recently have been integrated into research in childhood psychopathology, already promise to infuse important conceptual and methodological approaches into the field that will complement and invigorate existing research. Advances in neuroscience include the localization of neurotransmitters in defined neuronal systems within the brain; elucidation of receptor and postreceptor mechanisms that mediate the effect of neurotransmitters; definition of neuromodulators; and the use of sophisticated imaging techniques, such as magnetic resonance imaging (MRI) to visualize fine brain structure and positron emission tomography (PET) to visualize metabolic and receptor characteristics in the brains of living patients. These technologies have already shed light on such childhood-onset disorders as Down syndrome, autism, and attention-deficit hyperactivity disorder.

In the field of genetics, researchers using recombinant DNA techniques have identified a rapidly growing number of markers along specific sites on human chromosomes, enabling investigators to locate

actual sites of certain genetic defects. Such markers will help to identify children at risk for certain mental disorders. They will also permit more incisive studies of the factors that prevent or promote the expression of an individual's genetic predisposition to a disorder. Linkage studies can lead to the identification of the gene or genes responsible for vulnerability to a particular disorder.

Advances in these areas of biology emphasize the importance of the multidisciplinary perspective captured by the biopsychosocial model described by Engel (1977). On the one hand, biological vulnerabilities may be expressed only when resistance is lowered through psychological or social risk factors. On the other hand, the effects of chronic discord in the family or prolonged psychosocial adversity may be most evident in children with biological vulnerabilities. For example, the range of intellectual outcomes associated with Down syndrome is surprisingly wide, exceeding that observed in the general population. This appears to be due in part to environmental and motivational factors: children reared in institutional settings do less well, on average, than children reared in their own families and educated in the least restrictive environments. Similarly, the effects of specific learning disabilities on general intelligence may be evident only when the educational system does not permit alternative learning strategies to be developed. Multidisciplinary collaborations are the key to the study of the developing child, if researchers are to trace how biological factors become modified by factors in the family, school, or community to produce either psychopathology or competence.

THE DEVELOPMENTAL PERSPECTIVE

In contrast to studies on adults, in which cross-sectional analyses or relatively brief outcome studies can be quite informative, research into the causes and determinants of mental disorders of children requires careful attention to the evolution of symptoms and vulnerabilities. Normal development, both from a psychological and from a neurobiological perspective, is characterized by the age-dependent emergence of certain skills and abilities that are critical to subsequent maturation. Sensitive periods of development may exist during which the individual is particularly vulnerable to certain insults or stressors. Finally, it is generally agreed that children are much more susceptible than adults to the influences of parents or other caretakers, peers and school, and the consequence of socioeconomic status. These environmental factors are also known to be critical in sustaining development. Some of these features of the developmental perspective are reviewed below.

Continuities and Discontinuities

Understanding the processes of personality development and the relationship between normal development and psychopathology has been enhanced by an appreciation of the conceptual and empirical issues raised by the concept of continuities-discontinuities (Sameroff and Seifer, in press). Continuity in functioning implies that severe symptoms lie on a continuum with milder problems and with normality. In contrast, discontinuity implies that clinical disorders are, by their very nature, distinct and separate from normal behavior. These two basic differences in perspective are consistent with the traditional dichotomy between the dimensional, spectrum approach to clinical problems and the categorical, disease entity model. As suggested by Rutter and Garmezy (1983), an integrated theoretical stance that considers the role of both categorical and dimensional factors in the causation of childhood psychopathology may be most useful.

Methodological difficulties have hindered research into continuities and discontinuities of another sort--namely, continuity over time of childhood disorders with the same or similar adult syndromes. Progress is being made on research strategies, including age-appropriate assessment tools and models of intervening variables. Given the nonspecific links between certain childhood behaviors and symptoms and certain adult disorders, some researchers have proposed a development-oriented model of competence (Cicchetti, Toth, and Bush, 1988; Harter, 1982). Competence models attempt to explain the observation that some individuals, despite risk factors, become well adapted and do not develop the disorder.

With respect to developmental psychopathology, the concept of continuities-discontinuities focuses attention on early risk factors, precursors, protective factors, and variability in clinical expression depending on age. Increased understanding of disorders that are continuous with adult mental disorders and disorders for which antecedents (even if subclinical) are known will make it possible for early interventions and preventive efforts to be more precisely targeted. Risk factors can also be examined with regard to their specificity and predictive validity by including them in family history studies.

Developmental Neurobiology

It has long been assumed that the developmental age of onset of serious mental disturbance reflects in some way the underlying maturation of the brain. However, it has only been within the last two decades that substantive advances have been made in developmental brain research. These findings are now providing neurobiological

correlates of use in clinical research on the causes and determinants of mental disorders in children.

Because neurotransmitters are the ultimate mediators of information processing in the brain, studies of transmitter-specific pathways in the rodent brain and to a lesser extent in the primate brain have been of great interest. These studies have revealed markedly different sequences of formation, differentiation, and synaptogenesis (formation of nerve interconnections) of those neuronal pathways thought to be of particular relevance to psychiatry, including the noradrenergic, serotonergic, dopaminergic, cholinergic, GABAergic, and endorphin systems. Particularly interesting is the very early development of the central noradrenergic and serotonergic systems, two neuronal systems implicated in mood states; their axons invade the primordial cortex and the limbic system as the latter are being formed. The dopaminergic system, which is implicated in psychotic conditions, develops much more gradually and does not mature until the end of the second decade of human life. The differential development of these neuronal systems may correlate with the age-related onset of symptoms of major mental disorders (Coyle and Harris, 1987).

A second area of investigation into the differences between the immature and the adult brain concerns the behavioral and physiological consequences of eliminating certain neurotransmitter systems early in development or at maturity. Dopamine, for example, is a neurotransmitter used by a group of neurons in the midbrain to innervate the striatum, a region involved in controlling movement, and the frontal cortex, a region modulating emotionality. In adult rats, destruction of the nerves in the forebrain that transmit dopamine to the central nervous system results in a behavioral syndrome of profound inactivity and sensory neglect. Lesions of comparable severity in the newborn rat result in hyperactivity (Zigmond, Acheson, Stachowiak, and Stricker, 1984). Stimulants administered to these animals increase motor activity in the adult and decrease overactivity in the immature animal. Finally, whereas administering drugs that simulate the action of dopamine reverses the decreased activity resulting from dopamine depletion in adult animals, they precipitate a syndrome of self-injurious behavior when given to young animals (Breese et al., 1984). In a similar vein, dopamine D-2 receptor-blocking antipsychotic drugs exhibit striking differences in potency and effect on behavior when administered to prepubertal versus postpubertal animals. Since the dopaminergic system is implicated in attention-deficit disorder, Tourette's disorder, and schizophrenia, studies of its action at different stages of development are likely to shed light on the pathophysiology of these mental disorders of children and youth.

A third emerging area concerns the interplay of neurotransmitters and brain differentiation. There is increasing evidence that during

development, neurotransmitters play a specific role in modulating neuronal differentiation, the growth of axons, the establishment of synaptic connections, and synaptic plasticity. Several studies have demonstrated that various forms of stimulation and enriched environments can increase synaptic complexity as well as cortical thickness in animals (Greenough, Hwang, and Govman, 1985; Rosenzweig, 1979). Neurobiologists studies have begun to discern the molecular mechanisms that account for the developmental effects of environment upon emerging brain synaptic circuitry and function. It is intriguing that the very neurotransmitter systems which regulate these developmental processes are also involved with a number of other important functions, including sensory transmission, emotion, cognition, and regulation of physiological states such as sleep. For example, research on the neurobiology of how sleep patterns mature is shedding light on developmental problems such as enuresis and night terrors. Further basic and clinical studies can contribute to better understanding of and treatment for these and other sleep disorders. The significance of sleep symptoms of certain mental disorders can also be clarified (Guillemenault, 1987; Carskadon, Anders, and Hole, 1988).

Sensitive Periods

Sensitive periods in development are those at which an organism is particularly vulnerable to an event such as sensory deprivation, emotional deprivation, malnutrition, or exposure to toxins. One of the key issues for clinicians and researchers has been to determine the sensitive periods for various adverse events and what factors affect vulnerability and resilience of the organism, reversibility of effects, and susceptibility to remediation. The consequences of some biological trauma have clearly been associated with timing--for example, congenital infections are most severe when exposure occurs prior to the third trimester of pregnancy. The short- and long-term effects of other biological insults are more variable and are being reexamined in relation to social and emotional trauma.

Compelling evidence of the importance of sensory experiences in shaping neurobiological maturation has been provided by animal research. The experiments of Hubel and Wiesel (1962) with cats demonstrated the impact of visual stimulation upon neural development, and Rosenzweig's (1979) studies of the effect of enriched environments on the developing rat brain revealed increased cortical thickness with more glial cells and more acetylcholinesterase. Casler (1968), who reviewed neurobiological development in children in institutional settings, found adverse effects associated with reduced stimulation.

Ethological, laboratory, and human studies have underscored the importance of the caretaker in infant development. Rene Spitz's (1946) series of studies on institutionalized infants found physical, psychological, and intellectual retardation in infants deprived of

individual attention, despite good physical care. Spitz's work on failure to thrive stimulated studies with better methods in which the general direction of his findings was supported (Rutter, 1979). Bowlby (1982) has focused on the evolutionary survival value of infant behaviors, such as crying, that keep mothers close to their infants. Consistency and continuity of caretaker are viewed as necessary conditions for forming secure attachments, and this view is supported by studies of children who have been placed in multiple foster care homes. Harlow's classic studies (1958, 1969) of infant monkeys reared without their mothers (with wire and cloth dummy surrogate mother; with no surrogate mother but with other infant monkeys) revealed problems in communication and social adaptation and later impairments in their own parenting behavior. Reite and Field (1985) documented the same agitation-depression response to maternal separation in macaque monkeys as in preschool children; in both cases, the response was accompanied by comparable alterations in immune system markers, sleep patterns, and cortisol levels. Recent studies have begun to identify the conditions that promote plasticity of children's behavior in overcoming the effects of early deprivation (Field et al., 1988).

The social, intellectual, and emotional consequences of adverse conditions, ranging from malnutrition to brain trauma to adverse parenting, underscore the variability in outcomes. Etiological research in child and adolescent psychopathology must include studies addressing the timing (both onset and duration of event) of the developmental processes, individual characteristics (vulnerabilities and assets), and environmental context. The notion of sensitive periods has traditionally been associated with the perinatal period and infancy, in part due to its heritage of animal studies; however, this concept is applicable at all stages of development. Applications of the concept of sensitive periods to studies of risk and protective factors are particularly important in finding ways to interrupt or prevent psychopathological processes in a variety of disorders. Further specifying the parameters of sensitive periods will affect the research strategy employed: cross-sectional studies might not detect the duration of the effect of adverse conditions, whereas longitudinal studies with periodic evaluations could. Given that past studies, such as those by Spitz and Bowlby, have had public and institutional policy implications (for example, hospital visitation and increased contact for parents of hospitalized children, primary nurses assigned, and shorter inpatient admissions), it seems likely that future findings relevant to etiology will also have policy implications.

Impact of Family, Peers, and Socioeconomic Status

In studying the interaction between a child's intrinsic vulnerabilities and the stressors that come into play at various stages of development, researchers have demonstrated the importance of other individuals and of social and economic factors in the emergence of symptoms in children.

Many studies have shown the importance of severe parental discord as a precursor of adolescent behavior problems, especially conduct disorders and antisocial personality disorders (Rutter, 1980; Vaughn, Block and Block, 1988). Disturbed family relationships, rather than broken homes as such, are closely linked with such disorders. Thus, among boys who had made a court appearance for delinquency, those from intact homes with severe and persistent family problems were more likely to become recidivists than those from broken homes. Similarly, a recent study of over 300 children of mentally ill parents has found that behavioral disorders are less prevalent if a child at risk has been removed from a maladaptive family environment to a foster or adoptive home characterized by less marital discord (Feldman, Stiffman, and Jung, 1987). Consequently, future studies should design and evaluate programs aimed at reducing marital discord, strengthening parenting skills, and expanding and improving the available pool of foster and adoptive families.

Relationships with peers play an especially potent role in the emergence of children's conduct disorders. Considerable research documents the importance of the socializing effects of peers as early as one year after birth. Mueller and Rich (1976), for example, report that clustering and socially directed play behaviors occur in groups of one-year-old boys. Other investigators have observed the beginnings of friendships, positive social reinforcement, and patterns of imitative behavior in children as young as two or three. Peer influence clearly peaks during the adolescent years. In an innovative study of the ecology of adolescent behavior, Czikszentmihalyi, Larson, and Prescott (1977) had adolescents record their own social behavior immediately following the transmission of a random signal by means of a beeper. The system permitted investigators to obtain data on behavior while the subjects were scattered throughout their neighborhoods and were engaged in a broad range of school, work, and play activities. These investigators found that nearly one-third of the subjects' time was spent in conversation with peers, yielding the conclusion that peers provide a key context for adolescent socialization.

Friday and Hage (1976) examined the relative effects of parents, peers, and other social influences on delinquency. They found peer group relationships to be especially potent when youth lacked close connections in organized settings such as home, community, school, or work. As youths spent more time with delinquent peers, they became increasingly isolated from other socializing agents and tended to develop criminal tendencies. Hence, with particular reference to delinquent activity, a weak family relationship seems to foreshadow heightened reliance on the young person's peer group. Polansky, Chalmos, Buttenweiser, and Williams (1981) demonstrated how economic and social deprivation are linked to parental predisposition to child abuse and neglect; moreover, they showed how such linkages persist through generations. Children clearly are at maximum risk when both of their major reference groups (parents and peers) reinforce or model

deviant behavior (Robins, West, and Herjanic, 1975).

Considerable evidence attests to the existence of a strong relationship between peer support and the commission of antisocial or delinquent acts. Studies by Eynon and Reckless (1961), Reiss and Rhodes (1964), and Murphy and Shinyei (1976) found that a significant majority of delinquent acts occur in the company of others and that the probability that a specific act will be committed by an individual depends upon the commission of the act by other members of the friendship group. Delinquents spend six times as much time with peers as nondelinquents do; offenders commit only a quarter of their delinquent acts while alone. Other studies suggest that the untoward influence of deviant peers can be largely neutralized by providing youths with opportunities for meaningful social relationships with nondelinquent peers (Conger, 1976). For example, the results of a multifactorial field experiment with 700 youths indicate that the maladaptive behavior of antisocial boys can, in fact, be reduced by enabling them to interact for prolonged periods of time with prosocial youths under the supervision of experienced mental health workers (Feldman, Caplinger, and Wodarski, 1983).

Poverty is linked indirectly but powerfully with risk for childhood behavioral disorders. As a number of social scientists have observed, family relationships can be directly influenced by severe economic hardship, which in turn can influence the socioemotional functioning of the child. For example, Elder, Nguyen, and Caspi (1985) indicated that children's risk of developmental impairment increases with parental rejection, and parental rejection may increase during periods of economic distress.

Severe economic disadvantage is associated with inadequate nutrition, health care, and housing (Segal and Yahraes, 1978). It is also associated with reduced parental supervision, single parenting, poor child care resources, and adverse child rearing and parenting patterns (Schorr, 1988; Wilson, 1987; Dutton, 1986; Link, Dohrenwend, and Skodol, 1986). Poverty can diminish parents' sense of effectiveness and engender the belief that their actions cannot be instrumental in bringing about helpful changes in the environment. In turn, these conditions can reduce the extent to which parents reward children's mastery and encourage trust, receptivity to change, and intellectual flexibility.

A plethora of social and economic factors merit study both to understand better the etiology of childhood behavior disorder and to identify more effective means of preventive and remedial intervention. Parenting behavior, relationships with siblings and peers, the functioning of school systems and of child care facilities, and the impact of severe economic disadvantage are but a few of the major social and environmental variables that must be considered. During the past two decades, considerable progress has been made in

developing techniques for measuring and analyzing these variables. These methodological advances have enabled researchers to study the complex interactions among these variables and to begin to disaggregate specific factors, albeit more common in economically disadvantaged circumstances, from poverty per se. Much remains to be done if significant progress is to be made in these areas of investigation.

THE MULTIDISCIPLINARY APPROACH: LEAD AREAS OF PROGRESS

Several areas of research appear to be moving rapidly and to be generating novel perspectives on the causes and determinants of mental disorders of childhood. An important aspect of these areas is that they involve multidisciplinary perspectives, which should lead to a clearer understanding of the complex interactions among developmental processes, intrinsic features of the child, and environmental influences. The substantial advances being achieved in the areas of epidemiology, treatment, and preventive intervention research are reviewed elsewhere in this book.

The Psychobiology of Parent-Child Interactions

The psychobiology of parent-child relations is particularly germane during the early years of life, when the largely helpless infant depends for survival on its parents. As the child matures, begins exploring its environment, and forms attachments to others, the psychological components of the relationship begin to displace to some extent the biological components. Biological, psychological, and social factors each play a contributory role throughout the child's life, however, with their relative contributions varying over time.

Two psychobiological factors are central to the social development of the infant: temperament and attachment. Temperament refers to individual differences in early emotionality, activity, arousal, and similar characteristics that are usually assumed to be influenced by genetic factors. Attachment refers to the emotional bond that develops between infants and significant caregivers. The quality of this bond is usually assumed to be enhanced by sensitive, responsive caregiving and--according to some investigators--may be influenced by infant characteristics.

Temperament

Recent attention to biologically endowed characteristics of children and an emphasis on children's contributions to their own development have led to tremendous research emphasis on early temperament. Temperament research draws from diverse areas of behavioral science. Plomin (1986) has suggested that the rising

number of temperament studies reflects a shift in the view of the child from a passive recipient of environmental influences to an active agent and a greater balance between biological and environmental explanations of developmental differences. Although not necessarily related to specific mental disorders, temperamental qualities are important because they promise to link genetic and neurophysiological characteristics with socially relevant behavioral patterns.

Almost all definitions of temperament include emphases on emotionality and activity and on biological underpinnings and behavioral continuity, but many aspects of theorizing about temperament are in a state of ferment (Goldsmith and Alansky, 1987). Among the issues under debate are the boundaries of temperamental constructs, the extent to which interpersonal phenomena should be included under the rubric of temperament, and the usefulness of concepts such as "goodness of fit" or "the difficult child." Empirical research on temperament centers around at least five broad topics: (1) measurement; (2) origins; (3) continuity and transitions; (4) functional significance for normal development; and (5) implications for maladaptive behavior and overt psychopathology. Researchers are pursuing all five topics simultaneously, creating a great need for updating the concepts about each topic as better measurement techniques become available (Plomin, DeFries, and Fulker, 1988).

The modern study of infant temperament was initially identified with interview and questionnaire measurement approaches, as devised in the pioneering studies of Thomas and Chess (1977). Recently, more than a dozen relatively sophisticated infant and toddler questionnaires have been introduced to the field. Standardization and analysis of the reliability and validity of these newer questionnaires are necessary preludes to advances in the field. At the same time, laboratory-based approaches to temperament measurement have been introduced by Goldsmith and Rothbart (1988), Kagan, Reznick, Snidman, Gibbons, and Johnson (1988), and Wilson and Matheny (1983), among others. These laboratory approaches are time-consuming and relatively expensive but offer an objectivity and precision unmatched by the questionnaire and interview approaches. They also help integrate temperament research with the broader field of the experimental psychology of infancy, which is also laboratory-based.

The question of the origins of temperament subsumes both behavioral-genetic approaches and psychobiological approaches. Twin and adoption studies indicate that levels of early activity and negative emotionality are moderately heritable. These behavioral-genetic studies have overturned the notion that genetic influences are strongest at birth and then diminish as the child is exposed to the environment; although much more research needs to be done, the opposite appears to be the case (Plomin, 1986). The

emphasis of genetic studies has recently shifted from simply establishing heritability of temperamental traits to investigating genetic factors that account for stability and change of temperament (Goldsmith, 1988). Other fruitful approaches to the origins of temperament include psychobiological studies of primates (Suomi, 1986) and recent cross-cultural investigations (for example, Miyake, Chen, and Campos, 1985).

Longitudinal studies are the lifeblood of temperament research, because they can address issues of continuity and transition. Both moderate continuity and significant periods of transition, where continuity is not as apparent, have been found. Although short-term stability has been established, the long-term predictive power of early temperament remains to be demonstrated across a variety of domains. Other than the threads of continuity from early childhood to early adulthood that were demonstrated in the New York Longitudinal Study (Chess and Thomas, 1984), little empirical evidence has been obtained with current temperament assessment instruments. Chess and Thomas (1984) found modest continuity of temperament from age three to early adulthood. Their clinical impressions suggested that temperamental continuity may be most apparent during periods of stress, with continuity less apparent when coping mechanisms come into play. In shorter-term longitudinal research, Kagan et al. (1988) have demonstrated and partially replicated stability of relatively extreme forms of inhibited behavior from infancy to age seven. The pattern of behavioral inhibition and shyness that they identified is apparently indexed by high, stable heart rates under certain experimental conditions and by high concentrations of cortisol in saliva. However, the degree of association with physiological indicators is not so high as to preclude nonbiological mediators. Recent findings suggest that marked behavioral inhibition may be a risk factor in young children of parents diagnosed with adult panic disorder or major depressive disorder, or both (Rosenbaum et al., 1988). Key issues deserving further research, therefore, are continuity revealed under stress, continuity of extreme versus midrange temperamental patterns, and continuity of behavioral patterns versus underlying physiology.

Once measurement issues are resolved, a key topic for future research should be the functional significance of temperament for normal development. Clearly, the goal of understanding the influences of temperament on childhood psychopathology cannot be achieved unless its influence on normal development is also understood. An assumption of many researchers is that temperamental dimensions predict the "affective core" of later personality traits (Goldsmith and Campos, 1986). For example, being prone to anger may predict later aggressiveness. After infancy, the affective core may be obscured by socialization, cognitive components, self systems, and other facets of the mature personality. With regard to interpersonal functions of temperament, valuable current research centers on the role of temperament in mediating reactions to parenting, interactions with

siblings and peers, and encounters with the educational system. Also, ongoing investigations of how maturation of attentional systems in the infant serves to regulate early temperamental reaction patterns are promising (Rothbart and Posner, 1985).

The question of whether temperament predicts childhood behavioral disorders has been prominent, but the evidence is still ambiguous. It is now well known that the early reports by Thomas, Chess, and Birch (1968) of the New York Longitudinal Study were not definitive in their suggestion that infant temperament ratings predicted childhood behavioral disturbances. Later studies, each subject to qualifications, have demonstrated modest links between infant temperament and later behavioral problems; these links are usually mild and may never come to professional attention. Negative affectivity that proves difficult for the caregiver to handle is the most common predictor, and the ensuing behavioral disorder often seems to take the form simply of an exaggeration of the temperamental dimension. Bates (1987) documents suggestive links between early temperament and childhood behavioral disorders, but the crucial research that will integrate temperament with other risk factors largely remains to be done. Carey (1986) has documented associations of childhood temperament with a variety of clinical conditions.

Virtually uninvestigated with modern assessment techniques is the role of temperament in adult psychopathology (Cloninger, 1987). Questions of why and how specific temperamental characteristics might predict the development of psychopathology should become central concerns for researchers.

Attachment

According to Bowlby (1969, 1982, 1988), caregiver-child attachment relationships are virtually universal and have evolved to promote survival of the species. Early in life, the relationship serves to keep the parent and child in close proximity. This affectionate bond helps to keep the infant safe; within the context of this relationship, offspring learn the necessary skills for competent functioning in their environment. Under normal conditions, the growing child strives for and is encouraged to become more autonomous in functioning and to form other attachment relationships (Ainsworth, Blehar, Waters, and Wall, 1978; Cicchetti, Cummings, Greenberg, and Marvin, in press).

Ainsworth and her colleagues elaborated on Bowlby's observations, developing a laboratory paradigm--namely, the strange situation--and a classification system (Ainsworth et al., 1978) for the empirical study of individual differences in attachment patterns.

Ainsworth's classification system included two patterns of insecure attachments--anxious-avoidant (Type A) and anxious-resistant (Type C)--plus a secure pattern (Type B). Infants' attachment relationships are classified into one of the three major types, based on ratings of their interactive behavior during the strange situation. Broadly conceived, the types lie on a continuum, with insecurely attached-avoidant infants at one end and insecurely attached-ambivalent infants at the other, bracketing securely attached infants in the middle. Each pattern is believed to represent an organized behavioral strategy for modulating internally and externally caused psychological arousal (Sroufe and Waters, 1977). According to this viewpoint, young children monitor the availability of their primary attachment figure in order to regulate their level of internal stimulation (Cassidy and Kobak, 1988; Sroufe, 1979).

Securely attached children maintain an appropriate balance between exploration and connectedness to their caregivers; they differ from insecurely attached infants in their abilities to be soothed by their caregiver when distressed and to share emotion (especially positive emotion) with their caregiver. In the presence of their caregivers, securely attached infants feel relatively free from anxiety and safe enough to venture out and explore the environment and seek novel stimulation. When under stress, securely attached infants can alleviate their heightened arousal through contact or communication with the caregiver, depending on the strength of the fear-eliciting stimulus. Mothers of secure infants have been found to be more sensitive and responsive to their infants' cues (Ainsworth, 1982; Belsky, Rovine, and Taylor, 1984). Approximately 70 percent of all infants form a secure relationship with their primary caregiver.

Anxious-avoidant infants are characterized by an appearance of neutral affect and a marked absence of attachment behaviors under conditions that would normally activate the attachment behavioral system (for example, during and after a brief separation from their primary caregiver in a strange environment). Research on the maternal correlates of avoidance in the strange situation has linked maternal rejection and aversiveness to close physical contact (a goal of infant attachment behavior) with the behavior of these anxious-avoidant babies (Ainsworth et al., 1978; Belsky et al., 1984; Main, 1981). A sizeable minority of infants in most samples form insecure anxious-avoidant relationships with their primary caregiver.

Anxious-ambivalent babies, in contrast, exhibit strong indices of arousal, including strong distress and angry resistant behavior, as well as exaggerated attachment behavior (for example, proximity-seeking, crying) in response to comparatively minor external stressors such as a brief separation from their caregiver. A subgroup of infants with insecure-ambivalent attachment patterns is characterized by extreme passivity and withdrawal from external stimulation (Ainsworth et al., 1978). Approximately 10 percent of all infants

form insecure anxious-resistant relationships with their primary caregiver.

Although one of the basic tenets of attachment theory has been that infants' attachment classifications are a result of their particular experiences with their attachment figures (Sroufe, 1985), speculations about the determinants of attachment patterns have not been without controversy. Several prospective longitudinal investigations support the notion that innate differences in temperament determine, at least in part, observed attachment behavior (see Goldsmith and Alansky, 1987, for a review).

In recent years much exciting work has shown that securely attached youngsters tend to do well in such developmental areas as autonomy and independent exploration, communication, peer relations, and ego resiliency (Sroufe, 1983). In contrast, insecurely attached youngsters are much more likely to have difficulty mastering these developmental tasks. During the past decade increased attention has been paid to the organization of the attachment system in handicapped, high-risk, and clinically disordered groups of youngsters. For example, a number of studies demonstrate that children who have been abused or neglected almost always form insecure attachments with primary caregivers (Carlson, Cicchetti, Barnett, and Braunwald, 1989; Crittenden, 1988). Likewise, children of mood-disordered parents manifest higher rates of insecure attachment (Radke-Yarrow, Cummings, Kuczynski, and Chapman, 1985).

Separation experiences in the real world show that fears of loss or separation from loved ones have marked consequences throughout the years of infancy, childhood, adolescence, and into adulthood. Children's fears, phobias, and anxieties can reflect fragile early attachments to caregivers. Rutter's (1981) reassessment of the effects of maternal deprivation strongly suggests that there are consistent consequences resulting from early life separation of the child from the significant caregiver. Some examples of these adverse effects include: (1) medically hospitalized children who have had poor relations with parents in families marked by discord and disadvantage tend to show more acutely disturbed responses to such separation events; (2) multiple foster home and institutional placements beginning in early childhood can predispose some children to a heightened risk for later antisocial behavior; (3) poor-quality institutionalization can lead to intellectual retardation in children exposed to such settings for prolonged periods.

On the other hand, it has also been found that some children subjected to maternal deprivation have successfully withstood later deprivation, disadvantage, and loss. These children evidence adaptive behavior which suggests that protective factors such as care and support were available to them despite their exposure to severe stress. Here, the effects of a supportive environment and of the

specific predisposition of the child may interact to prevent future deviance. The literature on the subject indicates that such variables as temperament characteristics, cumulative exposure to stress, developmental status of the child, the presence of adequate individual, social, and cognitive competencies, and even the child's sex may affect response to loss of a parent through death or divorce (boys appear to be more negatively influenced by loss and family breakup than are girls).

Recent research has begun to address the neurobiological basis of specific components of infantile attachment. In an intriguing series of studies that used a rat model to correlate with clinical separation experiences in infants, Schanberg and Field (1987) demonstrated a specific, centrally mediated neuroendocrine response to separation. They observed that acute separation of the infant rat from the mother resulted in a rapid and profound reduction in the activity of ornithine decarboxylase (ODC), an enzyme critical to cellular growth. Tracking backward, they demonstrated that this reduction in ODC reflected a profound decrease in the release of growth hormone, which appears to be mediated by central endorphin mechanisms. To determine what behavioral interactions of the mother and the pup prevented this striking decrease from taking place, the front and back of the pup was stroked with a stiff brush. This action mimicked the natural tongue licking provided by the mother and prevented the suppression of growth hormone. These observations were translated to the hospital nursery, where investigators showed that periodic massage of premature infants in isolettes significantly enhanced their weight gain in comparison to matched control infants who were also separated from their mothers but who only received standard care and routine stimulation (Field et al., 1986). Although not all such connections are made so easily, this is a superb example of complementary animal and human research.

Similarly, ethological studies of the species-specific behaviors of infant animals separated from their mothers have implicated central noradrenergic and cortical trophic releasing factor (CRF) as biological substances that mediate these behaviors. These and similar studies indicate ways in which some of the neurobiological mechanisms involved in attachment can be explored, hopefully with increasing relevance to human behavior.

Role of Risk and Protective Factors in Childhood Psychopathology

In recent years, the concepts of risk factors and protective factors have come to exert a powerful influence on research in epidemiology, psychiatry, psychology and psychopathology. These concepts are essential to an understanding of why some children adapt in positive ways to a stressful environment and others develop behavioral disorders. Of equal importance, research on risk and

protective factors sheds light on the concepts of continuity and discontinuity and the progression of behavior from childhood disorder to adult psychopathology. Research on these central concepts also contributes to studies of vulnerable and stress-resistant individuals, their environments, and the interactions that predict successful and unsuccessful adaptation. Thus, information bearing on risk and protective factors not only sheds light on what factors direct development toward adaptation or disorder, it may also be instrumental in the development of prevention strategies for persons at risk.

The concept of risk is rooted in epidemiology and is concerned with the distribution of disease or disorder in a population; the identification of an ill individual (a case), the isolation of variables that correlate with illness; and the use of methods to reduce the incidence and prevalence of disease. Today, mental health investigators have joined epidemiologists in identifying a compendium of indicators of increased risk. A compelling example of the delineation of risk factors comes from a study of the prevalence of mental disorder in children living in two quite different geographic areas--the Isle of Wight and an inner borough of London (Rutter, Cox, Tupling, and Yule, 1975; Rutter and Quinton, 1977). The study revealed six risk factors within the family environment that correlated significantly with childhood mental disturbance: (1) severe marital discord, (2) low social status, (3) overcrowding or large family size, (4) paternal criminality, (5) maternal mental disorder, and 6) admission of the child into local authority (foster placement). Probability of mental disturbance increased progressively with the number of these variables within the family. Thus, a single risk factor did not significantly increase the rate of mental disorders in comparison with children whose families were completely free of such factors. In contrast, the presence of two risk factors resulted in a fourfold increase in the likelihood of mental disturbance, and the presence of four indicators resulted in a tenfold increase.

If risk factors contribute to the development of mental disorder, then protective factors may limit the expression of disorder, despite the presence of the risk factors. The existence of protective factors is inferred from the absence of disorder in children whose environments contain risk factors known to be reliable predictors of mental disorder. Having observed that marital discord and parental psychopathology were potent risk factors for behavioral disturbance in children, Rutter (1979) selected a sample of children living with their biological parents who met these two criteria. In all families, the marital relations were manifestly discordant; but in some households, the children had a loving relationship with one of the parents, whereas in the comparison households, the children had a negative relationship with both parents. Comparing the adaptation of the children in these two groups, Rutter found that the incidence of mental disturbance in the offspring was 75 percent in the latter group, whereas it was only 24 percent in the former. In another

study, Rutter et al. (1975) examined the prevalence of conduct disorder in children who were removed from their parental homes, which were marked by discord, and placed in more harmonious foster homes. The results indicated that the risk for conduct disorder was 2.5 times greater in children who remained in the families marked by hostility and discord as compared to those placed in a supportive foster family.

Studies such as these indicate that a supportive, stable, and cohesive family environment exerts a protective influence on the child during development. In a review of the literature of the adaptation of children under stress, Garmezy (1985, 1987) confirmed the salience of family environment. He identified three variables that seem to accompany the retention of competence and resilience in children confronted with stressful situations. These include (1) the personality of the child; (2) a supportive family milieu; and (3) an external support system that encourages and reinforces the child's coping efforts and strengthens them by inculcating positive values and creating a model for helpfulness.

Although these three categories of variables appear on the surface to be psychosocial, it is likely that biological processes contribute to their expression. A child's disposition reflects not only good rearing practices, but the child's genetic and constitutional temperament as well. Similarly, cohesive families reflect parental attributes of warmth and responsiveness to the needs of offspring. Biological factors also play a role in the personality and resilience of such parents and suggest that similar characteristics were present in grandparents as well. "Support systems," although usually conceived of as essentially psychosocial, may also be stimulated and maintained by the characteristics of search, persistence, and competence in the supported person.

Whatever the components of these variables, qualitative rather than quantitative elements predominate at this point in the research literature of protective factors. Nevertheless, it is evident that research in this area is of considerable importance in the search for underlying mechanisms of resilience that identify stress-resistant children. Equally important is the comparative study of children prone to mental disorder and their capacity to overcome stressful events and conditions.

Taken together, these studies suggest that stressors, or stressful life events, are risk factors (Elliott and Eisdorfer, 1982). Although the vagueness of the concept of stress has provoked many efforts to discard it, it remains an important component in the study of the antecedents of behavioral disorder in children. Yet, the systematic study of stressors (which are operationally defined by some as environmental changes that induce marked tension and interference in normal patterns of responding) as risk factors in childhood has lagged

behind analogous research with adults. A new generation of studies of response to stress and its correlates is now emerging (Garmezy and Rutter, 1983, 1985; Masten and Garmezy, 1985).

Animal Models

Animal models play a vital role in hypothesis testing and theory construction about human beings. The need to establish comparability can be especially difficult in studying mental disorders, because animals cannot say what they are feeling. Research with nonhuman primates emerges as particularly important because of their phylogenetic relationship to humans and their complex cognitive, affective, and social capacities. Considerable control can be exercised over the life events of captive animals, and comparative research on related species of primates enables investigators to assess genetic-environmental interactions. Given these advantages and the fact that nonhuman primates mature more rapidly than humans, the study of the development of nonhuman primates offers a way to understand both biological and experiential factors that may influence the emergence of mental disorders in children.

Many of the problems of greatest concern are extremely complex in human beings. Not all symptoms are present in any child, and many children go through periods of more or less disordered functioning. Thus, it is necessary in animal research to find parallels to specific human symptoms and to determine the conditions under which and the developmental periods during which the behavior in question expresses itself.

As with humans, it is to be expected that animal subjects will exhibit differences in their vulnerability to specific stressors. Studies of individual variation in susceptibility within a species, coupled with carefully designed comparative research, offer considerable promise for disentangling the complexities of the genetic-environmental precursors of developmental psychopathology. For example, there is increasing interest in studying behaviorally deviant offspring in primate colonies--whereas previously these "outliers" were culled from colonies to ensure uniformity of behavior. Studies by Suomi (1986) have revealed heritable patterns of such deviant primate behavior as shyness and anxiety in the young, which may be linked to alterations in central catecholaminergic neuronal function.

In addition to the more direct approaches to pathological development, many basic dimensions relevant to the understanding of mental disorders are now profiting from animal research. Advances in animal behavior research in the last two decades have enabled investigators to describe in considerable quantitative detail the development of many aspects of behavior from the neonatal period

onward; indeed, even assessments of prenatal behavior have begun to emerge. Existing techniques permit increasingly detailed correlations between the emergence and stabilization of various behaviors and maturation of corresponding elements of neurobiological systems. Because the developmental environments of laboratory animals can be controlled and held relatively constant over time, long-term studies would permit systematic determination of the ways in which various capacities and particular behaviors change or persist. Such studies, properly applied, can be highly informative with regard to the important issue of continuity and discontinuity of behavioral disorders in infancy, childhood, adolescence, and adulthood.

Nonhuman primates, like humans, have a prolonged period of infantile dependence and generally have very strong emotional ties to primary and secondary caregivers. Hence, primate studies of the factors governing both the infant's and the mother's attachment processes, which are so central to both normal and disordered human development, play a major role in guiding the study of human emotional and social development. Environmental variables studied in primate research include work demands on the mother and social support for the infant during periods of maternal separation. This line of research has demonstrated the impact of disruptions in normal caregiving on infant early development and their long-term sequelae. One notable finding is that therapeutic interventions after severe deprivation can reverse much of the apparent deviant behavior; however, during later periods of stress, behavioral pathology becomes quite evident in these developmentally deprived primates.

Because primates have relatively sophisticated cognitive capacities, they can be used in studies of complex social and nonsocial information processing. These studies can be carried out in primates raised under both "normal" and experimentally manipulated conditions. Using computer-based and video techniques, as well as the more common rating paradigms, investigators can study simple and relational learning, memory, social discriminations, and the formation of efficient strategies for acquiring food. Even the most complex processes of language acquisition have been explored in our closest primate relative--the chimpanzee.

As reviewed by Goldman-Rakic (1987), the developing primate is increasingly the focus of interdisciplinary studies that link the developmental aspects of cognitive function, the maturation of relevant regions of the brain, and the neurophysiology and synaptic chemistry of the involved systems. For example, the delayed-response task, which tests the ability to learn and respond to situations on the basis of stored information, is mediated in monkeys by the prefrontal cortex and in humans through its connections to the parietal, associational, and limbic cortexes and to lower structures. Although these pathways begin to form in the second trimester of pregnancy, synaptic density in the monkey peaks in the prefrontal

cortex between two and four months after birth. The capacity to perform this task emerges four months after birth, as synapses are being pared down, and reaches its optimum in adolescence, as synaptic stabilization takes place. Studies of the effects of lesions on the prefrontal cortex of fetal and infant monkeys have demonstrated not only the ability of the developing brain to compensate for such damage but also have illuminated the mechanisms of synaptic plasticity that may account for recovery (Goldman-Rakic, Isseroff, Schwartz, and Bugbee, 1983).

Developmental Cognitive Psychology

In investigating the causes and determinants of mental illness in children, it is important to understand the relationships between aspects of disorders of information processing and subsequent higher order cognitive or affective disorders. Studies of normal development of mechanisms subserving attention, perception, motor and memory functions, as well as higher-order cognitive processes such as categorization and representation, will provide building blocks for eventual understanding of abnormal processes. Research advances in cognitive psychology have provided a unique window from which to observe the developing brain by monitoring neurocognitive changes as they unfold throughout development. Present techniques allow researchers to observe--even in the newborn infant--attention, perception, and motor function, as well as specific aspects of higher order cognition and the interrelationship and maturation of these processes over time (Mussen, 1983).

One of the cognitive functions of most interest in humans is language. Developmental cognitive psychologists have attempted to understand how language develops by investigating the components of both linguistic and relevant nonlinguistic processes. Initially, studies of language disorders in children were mainly descriptive--assessing language systems from a linguistic standpoint, especially the development of phonological, morphological, semantic, syntactic, and pragmatic aspects of language. More recently, a neuropsychological approach to the study of developmental language disorders has focused on investigating the nonlinguistic sensory, perceptual, motor, symbolic, memory and cognitive processes that may be prerequisites to the development of normal language. These studies have helped clarify the causes and determinants of developmental disorders of language and learning.

Although language and learning disabilities have previously been classified as separate disorders of childhood by DSM-III-R (American Psychiatric Association, 1987), the results of recent longitudinal studies have demonstrated a clear relationship between developmental language problems and subsequent developmental learning disability (Aram, Ekelman, and Nation, 1984; Fundudis, Kilvin, and Garside, 1980; Silva, McGee, and Williams, 1983). Tallal (1988) found that

language-impaired children, identified in the preschool years, have an unusually high level of academic failure in elementary school. Specifically, children with oral language disorders subsequently show particular difficulty learning to read and spell. Similarly, children with specific developmental reading impairment (dyslexia) have oral language deficits. Although there is considerable interest in identifying a variety of subgroups of children with reading disorders, the largest subgroup of reading-impaired children are clearly characterized by phonological disturbances (Liberman, Shankweiler, Camp, Blachman, and Werfelman, 1980). When reading-impaired children with these deficits are carefully assessed, they show a neuropsychological pattern of abilities and disabilities that is strikingly similar to that reported for children with specific developmental language disorders (Tallal and Stark, 1982). This has led to hypotheses that certain developmental language disorders and developmental reading disorders may share an underlying neurological timing deficit and, as such, may represent the same neurological construct, which differs primarily by the age of the child and the learning skills being acquired at different ages.

The understanding of the mechanisms involved in specific language disorders is important for childhood psychopathology because of the increased prevalence of behavioral disturbances in children who are identified as language impaired (Richman, Stevenson, and Graham, 1975; Cantwell, Baker, and Mattison, 1979; Beitchman, Nair, Clegg, and Patel, 1986). In addition, there is an important degree of comorbidity of language disorders with attention-deficit hyperactivity disorder and, to a variable extent, with conduct problems. Language and learning disorders are also significant, if not intrinsic, components of certain childhood mental disorders such as Tourette's disorder and pervasive developmental disorders (Cantwell and Baker, 1987; Shaywitz and Shaywitz, 1985; Tallal, Dukette, and Curtis, 1989).

The importance of developmental cognitive research is that it addresses the intricate processes and mechanisms that develop over time into higher cortical functions. The neural mechanisms and processes needed to develop a complex, cognitive system may be quite different from those required to maintain that system, once developed. For example, studies of the processing of sign language in the congenitally deaf, as well as the acquisition of a second language, have revealed a critical developmental period beyond which impairment in achieving fluency with regard to specific aspects of grammar and syntax can be clearly demonstrated (Newport, 1984; Newport and Supalla, 1988). Other studies with the congenitally deaf point to remarkable plasticity of neural mechanisms underlying language development that can be alternatively accessed by either an auditory or a visual sensory input system (Neville, 1985; Poizner, Klima, and Bellugi, 1987). Such critical information about the neurobiological basis of language would be very difficult to glean without a focus on the developmental process. Although language has been used as an

example here of an important higher cognitive system in humans, developmental studies in other cognitive domains, such as spatial cognition, symbolic representation and categorization, also have been undertaken.

Recent advances in developmental cognitive science parallel those made in other areas of neuroscience, including neurobiology, molecular genetics, and neuroimaging. Each of these areas holds tremendous promise for a better understanding of the neurological basis of developmental disorders. Moreover, the field is now in position to begin to undertake important multidisciplinary research which combines knowledge from each of these several areas to tackle difficult questions pertaining to developmental mental disorders. Such research would be greatly enhanced by longitudinal studies.

Genetic Research

A great difficulty in research on mental disorders in general, and in studying child mental disorders in particular, is knowing whether a syndrome is mainly the consequence of a disturbed environment, a genetic predisposition, or an interaction between a specific genetic vulnerability and a particular environment. By using the emerging human gene maps, it will be possible to identify virtually any gene or group of genes that causes disorders which aggregate in families. Accordingly, one major goal of research on mental disorders of children should be to identify the location of genes that contribute to mental disorders across the age spectrum.

For well over two decades, investigators have tried to use physiological, metabolic, and endocrine means to identify genetic markers associated with mental disturbance. However, these biochemical markers, which are gene products, are largely continuous in their distribution in the population, so that it is very difficult to determine where the "normal" level ends and the "abnormal" begins. In contrast, a mutation is dichotomous: either it is present, or it is absent. Moreover, if a mutation is present, it can be detected, even when it is associated with a confusing clinical picture. Information about mutations could substantially improve the ability to make early, correct diagnoses by clarifying the spectrum of phenotypic (symptomatic) expression of disorders related to specific mutations. Also, investigators will be able for the first time to disentangle biological from social environmental influences and to clarify their interactions with regard to specific syndromes because the genetic variable could be ascertained (for a review, see Plomin, 1989).

All the clinical and genetic methods needed to identify genes responsible for vulnerability to specific mental disorders are sufficiently developed and available now (Leckman, Walkup, Riddle, Towbin, and Cohen, 1987). A major impediment to using genetic markers

to identify genes was the small number that had been mapped on the human genome. This obstacle no longer exists, because of the discovery (made possible by restriction enzymes) that the human genome is replete with potential markers in the form of neutral or non-disease-causing variations in DNA. Now, a large number of DNA variants, or polymorphisms, have been identified and localized with respect to each other on the human chromosomes, providing a linkage map with "road signs" at very close intervals (Donis-Keller et al., 1987; McKusick, 1989; Pardes, Kaufmann, Pincus, and West, 1989). In the future, this will permit the determination of the gene loci for virtually any disorder caused by a single gene or by two or more interacting genes can be found.

Of particular importance to child mental health research, the map permits the use of a method--simultaneous search (Lander and Borstein, 1986)--which overcomes the previously daunting problem that not all families with the same clinical disorder harbor the same gene mutation. For example, some families with bipolar affective disorder are known to have a gene mutation on the X-chromosome (Baron et al., 1987) and others on chromosome 11 (Egeland et al., 1987). Other genetic factors probably also exist. Current techniques make it possible to pick out such genetic influences even with relatively small families that have a genetic mental disorder.

Another strategy that combines fundamental neuroscience research with the genetics of mental disorders employs "candidate genes." At an ever-increasing pace, as brain proteins are isolated and purified, investigators are identifying where each is encoded on the human genome. For example, the gene encoding for tyrosine hydroxylase, the initial and rate-limiting step in the synthesis of dopamine and norepinephrine, has been mapped to human chromosome 11; and somatostatin, a neuropeptide that occurs in reduced amounts in the neocortex in individuals with Alzheimer's disease, has been mapped to human chromosome 3. If a candidate gene is located and is implicated through linkage analysis to a particular mental disorder, it is then possible to look directly for a causal connection between that gene and the disorder of interest, for example, bipolar affective disorder.

Gene searches are expensive and cannot be undertaken without convincing evidence that such an investigation holds promise. First, it is necessary to have a sufficiently clear phenotype--a clinical or behavioral disorder--that, within limits, constitutes a reliably identifiable entity. In this regard, panic disorder would be easier to investigate genetically than generalized anxiety disorder and classical autism easier than the less well-defined group of children with the diagnosis of "pervasive developmental disorder." Validation of the clinical entity need not be complete for initiating such a study; to the contrary, genetic markers may play a role in validating certain diagnostic categories.

Second, evidence from epidemiologically-based studies must suggest that familial aggregation of the disorder occurs in a way not consistent with cultural transmission. Such studies can also better define the limits and the variability of the clinical entity and can be complemented by a variety of strategies including twin studies, adoption studies, and longitudinal studies. These approaches have been used extensively to implicate heritable factors in a number of mental disorders affecting adults, but information about heritable factors responsible for disorders uniquely affecting children, or that have an early age of onset, is much more limited, because of the difficulty in reliably defining the clinical entities in the child mental health field (Chapter 2). Nevertheless, in recent years, the limits and variations for phenotypes for childhood affective syndrome (Weissman et al., 1984), autism (Piven et al., in press), Tourette's disorder (Pauls and Leckman, 1986), and attention-deficit hyperactivity disorder (Henker and Whalen, 1989) have been studied in some detail--even though information utilizing twin and adoption strategies is quite limited. For example, with regard to research on autism, the familial aggregation of the core syndrome is only about 2 to 3 percent. But conceptually similar, less severe variants of autism in the form of certain language disorders and social deficits are present in about 25 to 50 percent of family members, a much higher rate than found in appropriate comparison groups (Wolff, Narayan, and Moyes, 1988; Piven et al., in press). One explanation for this finding could be a major gene that predisposes to social and language deficits but requires an additional factor for the appearance of the full syndrome of autism.

The third prerequisite for a gene search is the identification of families in which several closely related members are affected with the core disorder; other members of the families may exhibit a validated, less severe variant of the disorder. Such pedigrees are "informative" because they permit the search for segregation of the marker polymorphisms with the observed expression of the disorder (Goldin and Gershon, 1989). "Segregation" refers to the hereditary association of a marker polymorphism with a gene possibly responsible for the disorder, indicating a close physical linkage between the two on a chromosome. Depending on the frequency of the disorder, such informative families may be obtained by one research group or may require collaborative efforts among several centers.

The time frame for finding the mutant genes responsible for those mental disorders that may be caused by one or two genes could be short or fairly prolonged, depending on good fortune and developments in the molecular methods that may make the search more efficient. The expanding identification of genes encoding for brain-specific proteins, especially for those involved in neurotransmitter systems implicated in the pathophysiology of major mental disorders, will greatly facilitate the identification of candidate genes and the direct assessment of their potential role in the pathophysiology of

the disorder. Identification of the mutant gene will allow the precise characterization of the physiologic consequences of mutation, thereby leading to the development of more effective and specific therapies. Of course, many mental disorders may be the result either of a number of independent gene mutations producing similar results or of complex interactions among many genes. The achievement of results in these instances will be much slower.

Even in the absence of characterizing the mutant gene, the discovery of a genetic linkage marker for the specific mental disorders will provide a powerful tool for identifying children at risk before they become symptomatic. This information will permit a number of studies. For example, the identification of a gene marker for a specific mental disorder will allow investigators to ascertain the limits and variation of the phenotype of the disorder. Are cyclothymia or compulsive gambling manifestations of the genetic vulnerability to affective disorder, as suggested by their aggregation in bipolar families? Are the language disorders and mild social deficits seen in families of autistic subjects due to the same genetic background? In addition, prospective studies of identified children at risk should clarify earlier, age-related symptomatic features of a disorder before it is full-blown. Is the mild dysthymia seen in the offspring of parents with affective disorder an early manifestation of affective disorder (Weissman et al., 1984)?

A particularly exciting benefit of the identification of gene markers for mental disorders will be the ability to directly identify and investigate gene/gene and gene/environment interactions. For example, some children with sickle cell anemia have a mild disorder because of the concomitant persistence of fetal hemoglobin, which takes some of the oxygen carrying load from the vulnerable cells. This discovery led investigators to explore strategies by which inactive fetal hemoglobin genes could be activated to reduce the adverse consequences of sickle cell anemia. In this regard, there appears to be wide variability in the severity of affective disorder, schizophrenia, autism, and Tourette's disorder, even within the same families. This variability in symptomatic manifestations suggests that other genes may exacerbate or ameliorate the effects of a particular mutant gene, consistent with the hypothesis that many heritable mental conditions involve the concerted action of several genes. If mental disorders can be eased by the modification of the expression of other (protective) genes, this would be an important line of basic investigation. In a related issue, it is unclear why severe affective disorder or schizophrenia sometimes presents in childhood, when the majority of cases become symptomatic later in life. Among the hypotheses amenable to study are that the child is either homozygous for a gene causing a mild form in the heterozygous state or that the child has inherited two different genes for the disorder, one from each parent. Alternatively, psychological or social factors might be pivotal in determining exactly when the

clinical disorder manifests itself. More broadly, research is needed to examine the interplay of genetic predisposition with environmental circumstance. Thus, researchers might seek psychological and social factors that precipitate or ameliorate the expression of, for example, suicidality in someone with a genetic vulnerability to depression. Or, investigators might look for genetic influences that protect against or exacerbate the impact of severe psychosocial stress.

Although the expression of psychopathology often differs considerably between children and adults, the genetic causes and underlying mechanisms for specific disorders and their clinical expression are likely to be quite similar. Accordingly, genetic investigations that focus on childhood mental disorders will inform us about these same disorders as they affect individuals in adulthood. In fact, the strategy will also work the other way around, with genes or genetic linkages associated with adult onset disorders used to identify offspring who have received the gene from the affected parent but may exhibit a different phenotypic expression.

Any discussion of the benefits that accrue from genetic research of mental disorders should also include a reminder of its hazards. In the past, society has been quick to discriminate against, even eliminate, persons who are perceived as harboring some genetic trait that would be detrimental to "humanity." Persons with Huntington's disease were among the first to be exterminated in Hitler's Germany. Even in this country, the results of early genetic research in the mental health field were misinterpreted by the nonprofessional community and became the basis for the eugenics movement, whose adherents believed that mental illness, crime, promiscuity and other types of social problems could be eliminated by preventing certain "genetically tainted" individuals from procreating (Leedmerer, 1972).

As gene markers are discovered that allow for the identification of adults and children at risk for mental disorders, an imperative responsibility will be to determine that this information is used only for the good: to provide early diagnosis for treatable conditions; to provide genetic counseling to families; to facilitate the search for effective treatments; and to assist in discovering protective factors that modify expression of the mutant gene. It is essential that appropriate thought and effort be expended to assure that such information is not used to stigmatize or discriminate against individuals with regard to employment, insurance, or other aspects of life.

THREE EXAMPLES OF MULTIDISCIPLINARY RESEARCH FROM A DEVELOPMENTAL PERSPECTIVE

One of the best ways to demonstrate the impact of research into the causes and determinants of mental disorders of children and youth

is to review the advances that have been made in the understanding of Tourette's disorder, depression in children, and the consequences of maltreatment of children. Progress has been substantial for each.

Tourette's Disorder

Tourette's disorder is a chronic, familial disorder that is characterized by motor and phonic tics that wax and wane in severity and an array of behavioral problems including some forms of obsessive compulsive disorder (Leckman et al., 1987). Over the past two decades, notable advances have occurred in our understanding of this condition, including: (1) that it and related conditions are much more common than previously recognized; (2) that the natural history of the disorder is complex and dependent in part on age- and gender-specific factors, (3) that vulnerability to Tourette's disorder is genetically mediated, (4) that environmental as well as biological factors can influence the severity of the disorder, and (5) that specific brain regions and specific neurotransmitter systems are likely to be involved.

Although more work remains to be done, epidemiological studies have led to more accurate prevalence estimates. Once thought to be a rare condition, the prevalence of Tourette's disorder is now estimated to be one case per 1,000 boys and one case per 10,000 girls; milder variants of the disorder are likely to occur in a sizable percentage of the population (Burd, Kerbeshian, Wilkenheiser, and Fisher, 1986). Epidemiological studies combined with psychometric studies of clinic populations have established the complex nature of the course of this disorder (Cohen, Bruun, and Leckman, 1988; Shapiro, Shapiro, Young, and Feinberg, 1988) and led to the development of valid and reliable rating instruments (Leckman, Towbin, and Ort, 1988).

Problems with attention, hyperactivity, and impulsiveness often occur in young children prior to the onset of tics. Motor tics usually appear during the first decade of life. The variety of possible motor tics is enormous, ranging from rapid, meaningless movements of muscles such as eye blinking, facial grimacing, or jerking of the shoulders or arms to more "purposive" movements such as grooming behaviors. A minority of patients display self-injurious behaviors, at times leading to blindness and deformity due to hitting, biting, and poking. Phonic or vocal tics, which usually develop after the onset of motor tics, also display a wide range from meaningless noises or sounds to elaborate verbal productions, at times including whole words and phrases. Alterations in the pitch, volume and rhythm of speech can occur, as can echo phenomena where patients will repeat the words or phrases of another person or of their own. Some patients develop a very disabling form of phonic tics where they utter or shout obscenities or make rude and inappropriate statements to others. Other notable features of tics include their occurrence in bouts,

their limited suppressibility (in which patients can "suppress" their symptoms for brief periods of time), their decrease during sleep or absorbing activities, and their exacerbation during periods of stress or fatigue.

In addition to tics, symptoms of obsessive compulsive disorder frequently appear during the course of Tourette's disorder. These symptoms can include obsessive thoughts that are distressing, for example, a recurrent thought involving a close relative being hurt or killed, as well as elaborate compulsive rituals such as hand washing for 30 minutes at a time or repetitive checking of locks and windows. Initial empirical studies reported that 12 to 30 percent of patients had prominent obsessive-compulsive symptoms. More recent studies relying on systematic assessment procedures and specified diagnostic criteria indicate that this proportion may be substantially higher (Montgomery, Clayton, and Friedhoff, 1982; Nee, Polinsky, and Ebert, 1982).

Some of the most exciting developments in this disorder have come from the application of genetic research strategies. Twin studies (where both identical and fraternal twins are studied) have demonstrated that genetic factors are involved (Price, Kidd, Cohen, Pauls, and Leckman, 1985). They have also provided the best evidence to date that non-genetic or environmental factors significantly influence the expression of this disorder.

Genetic studies of families have provided evidence that some forms of obsessive compulsive disorder are etiologically related to Tourette's disorder (Pauls and Leckman, 1986). They have also provided conclusive demonstration that the disorder is transmitted vertically in families, from one generation to the next, and that a single gene may be responsible (Pauls and Leckman, 1986). This finding has lead to the identification of large multigenerational families suitable for genetic linkage studies (Kurlan et al., 1987). These studies may well lead to the localization of this gene to a specific chromosomal region. Such a finding would be very important, as it would represent the first concrete step towards characterizing this gene through the use of molecular genetic techniques.

By characterizing the gene and understanding its action, it may well be possible to offer more effective treatments that are rationally based. Another more immediate benefit from the linkage studies will be the capacity to identify those individuals in an affected family who are at risk to develop the condition. This, in turn, will set the stage for another round of epidemiological studies focused on efforts to define the risk and protective factors that are active in this condition through the use of prospective longitudinal studies of "at-risk" individuals. Sensitive periods may be defined. The identification of these factors and the timing of their action would permit the development of early intervention programs aimed at

minimizing an individual's risk of developing a severe form of this condition.

Pharmacological treatment studies led to the development of drug treatment (haloperidol, a potent dopamine antagonist) for the most prominent symptoms of this condition (Shapiro, Shapiro, Bruun, and Sweet, 1978). The recognition that specific neurotransmitter systems were involved in this disorder has provided valuable insights with regard to what brain regions are affected (Leckman et al., 1987). Neuropathological studies and neuroimaging studies of individual cases have consistently implicated subcortical brain structures, primarily the basal ganglia and regions of the midbrain, thalamus, and anterior cerebral cortex (Haber, Kowall, Vonsattel, Bird, and Richardson, 1986; Laplane, Widlocher, Pillon, Baulac, and Binoux, 1981). Efforts to confirm and extend these findings using newer tissue-based techniques and more sensitive and specific imaging procedures will undoubtedly advance our understanding of the basic brain mechanisms involved in this disorder. Imaging studies may also provide a window into the brain that would make it feasible to monitor the effectiveness of specific treatments directly.

Tourette's disorder may serve as a model condition for understanding the interplay of biological and psychological factors during the course of development. Interdisciplinary research involving clinical investigators, epidemiologists, psychometricians, behavioral and molecular geneticists, neuropharmacologists, neurochemists, and neuroanatomists has played a critical role in the remarkable scientific advances that have occurred in this field, and they can be expected to make even more important contributions in the future. It is also likely that, as the developmentally-based abnormalities of Tourette's disorder become clearer, aspects of normal brain development will be elucidated which, in turn, should contribute to our understanding of other mental disorders of childhood onset.

Childhood Depressive Disorder

Depression can be viewed from several perspectives: as the normal reaction to a loss (such as death of a parent); as a symptom, which frequently accompanies other mental or medical conditions (such as a disabling illness); or as a disorder (major depressive disorder). In light of the alarmingly escalating rate of suicide--the second most common cause of death in adolescence--depression is a serious public health problem for youth. Research has already highlighted several of the risk factors for depression in youth, as well as its adverse impact on family relationships, peer interactions, school performance, and in contributing to substance abuse. Furthermore, severe medical illnesses such as cancer can cause striking, physiologically mediated symptoms of profound depression in children (Maisami, Sohmer, and Coyle, 1985). However, recent research has demonstrated the existence of a syndrome of depression in children that appears to be minimally

related to life circumstances as a precipitant.

With the development of operationalized diagnostic criteria, clinical studies revealed that many children who were brought for mental health evaluation satisfied the same criteria utilized to diagnose major depressive disorder in adults, thereby indicating that major depressive disorder does indeed occur in youth (Puig-Antich and Weston, 1983). Careful studies have revealed that certain pathological features that are prominent in adults with depression, for example, disruption in the sleep pattern and hypersecretion of cortisol, are less frequent in children with major depressive disorder. However, a persistent abnormality in the regulation of growth hormone secretion, even after resolution of episodes of depression in children, has been reported. The symptomatic features may also differ somewhat in the pediatric population, compared with typical adults with depression. In children, irritable mood may occur instead of depressed mood, and failure to gain expected weight represents the equivalent of weight loss observed in adults. Although depressed children may be somewhat more emotionally responsive to their environmental circumstances than are depressed adults, anhedonia (complete loss of pleasure in things that ordinarily give pleasure) and even suicidal preoccupation do occur frequently in affected children (for a review, see Shaw, 1988).

Estimates of lifetime risk for affective disorders from epidemiological studies carried out in adults range from 8 to 15 percent. Unfortunately, rigorous data on the prevalence of major depressive disorder in children are quite meager, but they do suggest that, at any given time, the prevalence of major depression in prepubescent children (using DSM-III criteria) is approximately 2 percent (Kashani et al., 1983). Other studies indicate that the prevalence in adolescents is substantially higher, between 5 percent and 10 percent (Shaw, 1988). Dysthymia, a milder form of depression, has a long duration in children, lasting 36 months or more on average; in addition, these dysthymic children are vulnerable to intercurrent episodes of major depressive disorder. The average duration of episodes of major depressive disorder is 7 months (Kovacs, 1989; Kovacs et al., 1984).

It is noteworthy that mania is very rare prior to puberty (Kovacs, 1989). However, when major depression is accompanied by psychotic symptoms before puberty, bipolar (manic-depressive) disorder is a frequent outcome later in life; this severe form of affective disturbance in children is associated with bipolar disorder in one or both parents.

One diagnostic challenge emerging from these studies involves the issue of comorbidity, wherein two mental disorders occur contemporaneously. Notably, coexisting mental disorders in children with major depression have been found to be the rule. Anxiety disorders, conduct disorders, and, in the adolescent, drug and alcohol

abuse are frequently associated diagnoses in affectively ill youth, as well as in the offspring of parents with affective illness (Kashani et al., 1987; Kovacs et al., 1984). For example, with regard to conduct disorder, "psychological autopsy" studies of successful adolescent suicides have revealed a high prevalence of delinquent behavior, and studies of institutionalized delinquents reveal a high percentage who satisfy the diagnostic criteria for major depressive disorder.

For a variety of reasons, including ethical constraints, few rigorous studies are available of the drug treatment of affective disorders in children and adolescents. The double-blind, placebo-controlled study of Puig-Antich and colleagues (1987) on prepubertal depressives suggests that response is linearly related to concentrations of tricyclic antidepressant medication in the blood. However, the rate of response to placebo was virtually identical to that with antidepressant medication in the children, suggesting an important difference (or discontinuity) between affective disorder in youth and in adulthood. Other studies, which have not used placebo controls, have found therapeutic response relationships to serum blood levels of tricyclic antidepressants that are similar to those found in adults. Nevertheless, clinical lore suggests that, unlike adults, adolescents with major depressive disorder often exhibit rather poor responses to tricyclic antidepressant treatment. Anecdotal reports point to the possible added efficacy of "lithium augmentation" or monoamine oxidase inhibitors in youth who respond poorly to tricyclic antidepressants. Taken together, this limited database emphasizes mainly how little rigorous research has been undertaken to determine how effective pharmacological treatments are for affectively disordered children (for a review, see Shaw, 1988).

The growing evidence from studies of adults that vulnerability to affective disorders can be inherited is being tested in studies of children. It is clear that there is a high degree of familial aggregation of affective disorders. Overall, the risk for first-degree relatives (e.g., parents or siblings) on average may approach 25 percent (Puig-Antich et al., 1989). Such models, when viewed from the pediatric perspective, are complicated by issue of comorbidity. For example, the high rates of problems with anxiety, conduct, and substance abuse seen in the children of affective-disordered parents may reflect related manifestations of a gene defect, the consequences of living with an affective disordered parent, or an interaction between the two.

An important issue concerns the factors that determine the age of onset of affective disorders. The risk period has traditionally been thought to be the second decade in the case of bipolar disorder, and later in the case of major depressive disorder (Merikangas, Bromet, and Spiker, 1983). Some studies have pointed to the role of assortive mating; thus, the child may be the product of two parents, both of whom are suffering from a form of affective disorder. Clearly, early

age of onset raises intriguing questions with regard to genetic vulnerabilities, family milieu, and other life stressors. In this regard, studies are being conducted to assess the interplay between the behavior of the affective disordered parent, the genetically vulnerable child, and the potential role of disruption in attachment. The emerging molecular genetic technology, when applied to affective disorder research, should assist in teasing out the relationships between disturbed parent-child interactions because of affective disorder in the family and the genetic vulnerabilities due to affective disorder.

In summary, the research on major depressive disorder in children and adolescents over the last decade has made quite substantial advances that have had considerable impact on clinical care. More effective diagnosis and the increasing appreciation of therapeutic interventions will reduce the pain, suffering, and disruption of normal development resulting from episodes of affective disturbance. Critical questions remain with regard to early identification and preventive interventions that may have considerable but, as of yet, poorly documented consequences on long-term outcome.

Consequences of Child Maltreatment

Studies of the sequelae of child maltreatment provide some of the clearest illustrations of the impact of social ecological factors on child development. This is a complex, insidious problem that, although more prevalent in impoverished families (Pelton, 1978), cuts across all sectors of society. In the most recent National Incidence Study, it was estimated that as many as 1.5 million children per year experience maltreatment (physical, emotional, or sexual abuse and/or neglect) nationwide (U.S. Department of Health and Human Services, 1988). The economic and human costs of maltreatment in American society are astronomical (Cicchetti and Carlson, 1989). The dollars spent in treatment and social service costs and lost in lessened productivity for a generation of maltreated children are probably in the billions (Dubowitz, 1986). "Maltreatment" conjures up images of bruises, fractures, and malnutrition. But it is the emotional damage, not the physical damage, that may have the most frequent and long-lasting deleterious effect on the development of children (Cicchetti and Carlson, 1989).

Only in the past two decades has the impact of maltreatment on children's development been studied systematically. Research on the consequences of maltreatment is important for enhancing the quality of clinical, legal, and policy making decisions for maltreated children. Decisions concerning such issues as whether to report a child as maltreated, whether to coercively remove a child from his or her home, how to develop services to meet the specific psychological needs of maltreated children, and how to evaluate these service efforts all

benefit from a solid and sophisticated database on the developmental consequences of maltreatment (Aber and Cicchetti, 1984; Wald, Carlsmith, and Leiderman, 1988).

During the past two decades, a number of well-designed and executed studies have documented the deleterious impact that maltreatment phenomena exert on the psychological functioning of the children. For example, maltreated children are far more likely than appropriately matched comparison youngsters to develop insecure attachment relationships (Crittenden, 1988; Egeland and Sroufe, 1981; Schneider-Rosen, Braunwald, Carlson, and Cicchetti, 1985), to exhibit deviations and delays in the development of their "self-systems" (Cicchetti and Beeghly, 1987; Egeland and Sroufe, 1981; Schneider-Rosen and Cicchetti, 1984), to manifest impairments in communicative development (Coster, Gersten, Beeghly, and Cicchetti, in press), to have difficulties with peer relations (Mueller and Silverman, 1989), to exhibit motivational impairments at the expense of achieving age-appropriate independence (Aber and Allen, 1987), and to have a variety of social-cognitive impairments (Smetana and Kelly, 1989). Additionally, maltreated children experience great difficulties adapting successfully to school (Erickson, Egeland, and Pianta, 1989). Concurrent and follow-up studies of maltreated children reveal a high prevalence of psychopathology in these children, including depression, conduct disorders, and delinquency (Kazdin, Moser, Colbus, and Bell, 1985; Salzinger, Kaplan, Pelcovitz, Samit, and Krieger, 1984).

At least fourteen professional disciplines are studying and responding to aspects of this problem: child psychiatry, clinical psychology, developmental psychology, economics, education, emergency medicine, family medicine, general psychiatry, law, nursing, pediatrics, public health, social work, and sociology. Coordinating their efforts is a major challenge in itself. Nevertheless, the confluence of findings documenting the detrimental impact of maltreatment on development underscores the need to support prevention and intervention efforts in the field of child maltreatment (see Dubowitz, 1989). Likewise, more prospective longitudinal research must be supported in order to design and implement developmentally appropriate services that meet the specific psychological requirements of maltreated children and their families (Cicchetti et al., 1988; Wolfe, 1987).

RESEARCH RECOMMENDATIONS

Remove Impediments to Research

Throughout this chapter, an array of the impressive opportunities have been identified as now available to make substantive advances in the research into the causes and determinants of mental disorders in

children and adolescents. In order for these opportunities to be fully exploited, it is essential to remove the impediments that deter investigators, interfere with the marshaling of intellectual resources, and prevent the mounting of multidisciplinary efforts. Three elements appear to be fundamental underpinnings for research progress in this field.

First, effective research must be motivated by a sophisticated appreciation of the developmental perspective. This developmental perspective is not restricted to the study of psychiatric and behavioral disorders of children since many disorders which become manifest in adulthood may have silent or unrecognized antecedents in childhood. Evidence supporting this contention comes from studies of depression and even senile dementia of the Alzheimer's type.

Second, comprehensive but fundamental understanding of the causes and determinants of mental disorders of children requires a multidisciplinary approach. This does not mean that support for the individual disciplines that contribute to the field of developmental research should be reduced. Rather, it means that substantial, incremental commitments are needed to mechanisms that facilitate and sustain interactions among these disciplines.

Third, developmental studies demand longitudinal analyses. In this, they differ from studies of adult psychopathology in which cross-sectional diagnosis and analysis of short-term interventions are customary and useful. Funding agencies must create appropriate mechanisms for longitudinal studies, which require a sustained commitment well beyond the periods of support currently the norm in mental health research.

Establish Structures to Support Interdisciplinary Research

A critical impediment to multidisciplinary research is the absence of structures to support it. Many excellent groups of investigators are allied in disciplines such as developmental neurobiology, developmental cognitive psychology, developmental social psychology, child psychiatry, social work, and education, but these groups are often isolated by departmental affiliations and separated geographically. Opportunities for fruitful communication, mutual education, and collaborative interaction are rare. Few centers are truly interdisciplinary, have an effective number of investigators involved in teaching and research, and have ready access to patient populations. This situation probably results, in part, from the absence of funding mechanisms to provide the sustained and substantive support necessary for their creation. Several strategies might be considered to redress these problems.

First, regular meetings that take a broad, interdisciplinary view of research on mental disorders of children should be sponsored. These meetings might be structured along the lines of the Gordon Conferences. They should be organized by senior members of the field, involve students and young investigators, and address important research topics that involve several disciplines. These conferences should be held in a somewhat isolated setting to encourage sustained involvement and collegial interactions among the participants.

Second, mechanisms for stimulating interdisciplinary research among geographically separated research groups should be considered. Existing academic structures often dictate that schools of social work, education, or medicine or departments of psychology, epidemiology, or sociology be located on separate campuses or in separate institutions substantial distances apart. These divisions hamper collaboration. The MacArthur networks and the NIH-funded Centers Without Walls have been effective in linking together geographically distant groups with common interests.

Third, efforts should be made to encourage the creation of Centers of Excellence for research in childhood mental disorders. Such a structure would provide the most efficient mechanism for carrying out clinical studies on epidemiology, pathophysiology, and treatment and preventive interventions. Although these centers might logically involve an affiliation with a mental health facility, they should not be restricted to departments of psychiatry or divisions of child psychiatry. The centers would play a role not only in research, but also in research training at the doctoral and postdoctoral levels.

Make New Research Technologies Available

Rigorous multidisciplinary research must make use of recent advances in techniques to examine the cognitive, structural, functional, and even genetic substrata contributing to childhood psychopathology. More sophisticated approaches to behavioral ratings and the necessity for managing complex databases for social, epidemiological, longitudinal, and services-related studies indicate that research on childhood psychopathology has come to require substantial computer support. Unfortunately, few research programs have ready access to properly equipped research laboratories or other essential equipment. Capacity building for research entails a major infusion of funds for equipment and modern research facilities to carry out first-rate investigations.

The granting agencies should consider some mechanisms to encourage, if not require, the creation of shared databases. From a developmental genetics perspective, knowledge about informative pedigrees, as well as access to their DNA (transformed lymphocytes), will be quite useful. From a psychopathologic perspective,

availability of validated instruments for assessing childhood psychopathology or monitoring symptom change would also be helpful for generalizing findings.

Four Areas of Special Concern

Several areas requiring specific support or the creation of novel support mechanisms deserve attention.

(1) Research on experimental animals is now bearing fruit in connection with studies integrating behavioral development, developmental cognitive psychology, synaptic chemistry, and neuroanatomy and physiology. Although studies in lower animals are instructive, nonhuman primates often provide the best model for clinically meaningful inferences. Their psychological vulnerability to their environment makes nonhuman primates particularly appropriate candidates for clinically-oriented research. Nonhuman primates used as subjects of research require especially sensitive handling, particularly with regard to their living arrangements; increasing recognition of these needs has made this type of research expensive. Moreover, public opposition to animal research has placed the future of primate centers in jeopardy. Properly managed primate centers are, however, a valuable resource that should continue to be supported.

(2) Sophisticated postmortem analyses of brains of individuals dying with neuropsychiatric disorders such as Alzheimer's and Huntington's diseases have catalyzed remarkable advances in the understanding of the pathobiology of these disorders. Some mechanisms for obtaining the brains of individuals who died with well-characterized developmental-behavioral disorders should be created.

(3) The causes and determinants of behavioral disorders in children with mental retardation or a history of brain damage, or both, remain poorly understood. This neglected population offers important opportunities for linking developmental-behavioral symptoms with specific brain abnormalities. Such research, which receives negligible support from NIMH, would both improve the care of such children and clarify brain mechanisms in developmental-behavioral disorders.

(4) Of immediate concern are the causes of mental disorders found in disadvantaged inner-city children. The rates of substance abuse, homicide,and suicide are escalating in this population. These children experience a number of risk factors including poverty, single parent families, and family violence. Furthermore they also bear significant biological vulnerabilities such as poor perinatal care, low birth weight and malnutrition. Discovering the interactions among these factors and other acquired and heritable vulnerabilities--and the protective factors that may promote resiliency--presents a challenge to society as well as to science.

References

Aber, J. L., & Allen, J. P. (1987). Effects of maltreatment on young children's socioemotional development: An attachment theory perspective. Developmental Psychology, 23(3), 406-414.

Aber, J. L., & Cicchetti, D. (1984). Socioemotional development in maltreated children: An empirical and theoretical analysis. In H. Fitzgerald, B., Lester, & M. Yogman (Eds.), Theory and research in behavioral pediatrics, (Vol. 2, pp. 147-205). New York: Plenum.

Ainsworth, M. D. S. (1982). Attachment: Retrospect and prospect. In C. M. Parkes and J. Stevenson (Eds.), The place of attachment in human behavior (pp. 3-30). New York: Basic Books.

Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. (1978). Patterns of attachment: A psychological study of the strange situation. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

American Psychiatric Association. (1987). Diagnostic and statistical manual of mental disorders (3rd ed., rev.). Washington, DC: Author.

Aram, D., Ekelman, B., & Nation, J. (1984). Prehistories with language disorders: 10 years later. Journal of Speech and Hearing Research, 27, 232-244.

Baron, M., Risch, N., Hamburger, R., Mandel, B., Kushner, S., Newman, M., Drumer, D., & Belmaker, R. H. (1987). Genetic linkage between X-chromosome markers and bipolar affective illness. Nature, 326(6110), 289-292.

Bates, J. E. (1987). Temperament in infancy. In J. D. Osofsky (Ed.), Handbook of infant development (2nd ed., pp. 1101-1149). New York: Wiley.

Beitchman, J. H., Nair, R., Clegg, M., & Patel, P. G. (1986). Prevalence of speech and language disorders in 5-year-old kindergarten children in the Ottowa-Carleton region. Journal of Speech and Hearing Research, 51, 98-110.

Belsky, J., Rovine, M., & Taylor, D. G. (1984). The Pennsylvania infant and family development project: III. The origins of individual differences in infant-mother attachment: Maternal and infant contributions. Child Development, 55(3), 718-728.

Bowlby, J. (1969). Attachment and loss: Vol. 1. New York: Basic Books.

Bowlby, J. (1982). Attachment and loss: Vol. 1 Attachment (2nd ed.). New York: Basic Books.

Bowlby, J. (1988). Developmental psychiatry comes to age. American Journal of Psychiatry, 145, 1-10.

Breese, G. R., Baumeister, A. A., McCown, T. J., Emerick, S. G., Frye, G. D., Crotty, K., & Mueller, R. A. (1984). Behavioral differences between neonatal and adult 6-hydroxydopamine treated rats to dopamine agonists: Relevance to neurological symptoms in clinical syndromes with reduced brain dopamine. Journal of Pharmacology and Experimental Therapy, 231, 343-354.

Burd, L., Kerbeshian, J., Wilkenheiser, M., & Fisher, W. (1986). A prevalence study of Gilles de la Tourette syndrome in North Dakota school-age children. Journal of the American Academy of Child Psychiatry, 25(4), 552-553.

Cantwell, D., & Baker, L. (1987). Developmental speech and language disorder. New York: Guilford Press.

Cantwell, D. P., Baker, L., & Mattison, R. E. (1979). The prevalence of psychiatric disorder in children with speech and language disorder: An epidemiological study. Journal of the American Academy of Child Psychiatry, 18, 450-461.

Carey, W. B. (1986). Clinical interactions of temperament: Transitions from infancy to childhood. In R. Plomin & J. Dunn (Eds.), The Study of temperament: Changes, continuities and challenges (pp. 151-162). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Carlson, V., Cicchetti, D., Barnett, D., & Braunwald, K. (1989). Disorganized/disoriented attachment relationships in maltreated infants. Developmental Psychology, 25(4), 525-531.

Carskadon, N., Anders, T., & Hole, W. (1988). Sleep disturbances in childhood and adolescence. In H. Fitzgerald, B. Lester, & M. Yogman (Eds.), Theory and research in behavioral pediatrics (pp. 221-249). New York: Plenum.

Casler, L. (1968). Perceptual deprivation in institutional settings. In G. Newton & S. Levine (Eds.), Early experience and behavior. Springfield, IL: Thomas.

Cassidy, J., & Kobak, R. R. (1988). Avoidance and its relation to other defensive processes. In J. Belsky and T. Nezworski (Eds.),

Clinical implications of attachment. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Chess, S., & Thomas, A. (1984). Origins and evolution of behavior disorders. New York: Brunner/Mazel.

Cicchetti, D., & Beeghly, M. (1987). Symbolic development in maltreated youngsters: An organizational perspective. New Directions for Child Development, 36, 47-68.

Cicchetti, D., & Carlson, V. (Eds.). (1989). Child maltreatment: Theory and research on the causes and consequences of child abuse and neglect. New York: Cambridge University Press.

Cicchetti, D., Cummings, M., Greenberg, M., & Marvin, R. (in press). An organizational perspective on attachment beyond infancy: Implications for theory, measurement, and research. In M. Greenberg, D. Cicchetti, & M. Cummings (Eds.), Attachment in the preschool years: Theory, research and intervention. Chicago: University of Chicago Press.

Cicchetti, D., Toth, S., & Bush, M. (1988). Developmental psychopathology and incompetence in childhood: Suggestions for intervention. In B. Lahey & A. Kazdin (Eds.), Advances in clinical child psychology (Vol. 11, pp. 1-73). New York: Plenum Press.

Cloninger, C. R. (1987). A systematic method for clinical description and classification of personality variants. Archives of General Psychiatry, 44, 573-488.

Cohen, D. J., Bruun, R. D., Leckman, J. F. (Eds.). (1988). Tourette's syndrome and tic disorders: Clinical understanding and treatment. New York: John Wiley & Sons.

Conger, R. (1976). Social control and social learning models of delinquent behavior: A synthesis. Criminology, 14, 17-40.

Coster, W. J., Gersten, M. S., Beeghly, M., & Cicchetti, D. (in press). Communicative functioning in maltreated toddlers. Developmental Psychology.

Coyle, J. T., & Harris, J. C. (1987). The development of neurotransmitters and neuropeptides. In J. D. Noshpritz (Ed.), Basic handbook of child psychiatry (pp. 14-25). New York: Basic Books.

Crittenden, P. M. (1988). Relationships at risk. In J. Belsky and T. Nezworski (Eds.), Clinical implications of attachment (pp. 136-174). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Czikszentmihalyi, M., Larson, R., & Prescott, S. (1977). The ecology of adolescent activity and experience. Journal of Youth and Adolescence, 6, 281-294.

Donis-Keller, H., Green, P., Helms, C., Cartinhour, S., Weiffenbach, B., Stephens, K., Keith, T. P., Bowden, D. W., Smith, D. R., Lander, E. S. et al. (1987). A genetic linkage map of the human genome. Cell, 51(2), 319-337.

Dubowitz, H. (1986). Child maltreatment in the United States: Etiology, impact and prevention. Unpublished manuscript (prepared for the Congress of the United States, Office of Technology Assessment), University of Maryland Medical School, Department of Pediatrics, Baltimore, Maryland.

Dubowitz, H. (1989). Prevention of child maltreatment: What is known. Pediatrics, 83(4), 570-577.

Dutton, D. B. (1986). Social class, health and illness. In L. H. Aiken & D. Mechanic (Eds.), Applications of social science to clinical medicine and health policy (pp. 31-62). New Brunswick, NJ: Rutgers University Press.

Egeland, B., & Sroufe, L. A. (1981). Developmental sequelae of maltreatment in infancy. New Directions for Child Development, 11, 77-92.

Egeland, J. A., Gerhard, D. S., Pauls, D. L., Sussex, J. N., Kidd, K. K., Allen, C. R., Hostetter, A. M., & Housman, D. E. (1987). Bipolar affective disorder linked to DNA markers on chromosome 11. Nature, 325(6107), 783-787.

Elder, G. H., Nguyen, T. V., & Caspi, A. (1985). Linking family hardship to children's lives. Child Development, 56, 361-375.

Eliott, G. R., & Eisdorfer, C. (Eds.). (1982). Stress and human health: Analysis and implications of research. A study by the Institute of Medicine, National Academy of Sciences. New York: Springer Publishing Company.

Engel, G. L. (1977). The need for a new medical model: A challenge for biomedicine. Science, 196, 129-136.

Erickson, M., Egeland, B., & Pianta, R. (1989). The effects of maltreatment on the development of young children. In D. Cicchetti & V. Carlson (Eds.), Child maltreatment: Theory and research on the causes and consequences of child abuse and neglect (pp. 579-619). New York: Cambridge University Press.

Eynon, T. G., & Reckless, W. C. (1961). Companionship at delinquence onset. British Journal of Criminology, 2, 162-170.

Feldman, R. A., Caplinger, T. E., & Wodarski, J. S. (1983). The St. Louis conundrum: The effective treatment of antisocial youths. Englewood Cliffs, NJ: Prentice-Hall.

Feldman, R. A., Stiffman, A. R., & Jung, K. G. (1987). Children at risk: In the web of parental mental illness. New Brunswick, NJ: Rutgers University Press.

Field, T., Healy, B., Goldstein, S., Perry, S., Bendell, D., Schanberg, S., Zimmerman, E. A., & Kuhn, C. (1988). Infants of depressed mothers show "depressed" behavior even with non-depressed adults. Child Development, 59(6), 1569-1579.

Field, T., Schanberg, S. M., Scafidi, F., Bauer, C. R., Vega-Lahr, N., Garcia, R., Nystrom, J., & Kuhn, C. M. (1986). Tactile/ kinesthetic stimulation effects on preterm neonates. Pediatrics, 77, 654-658.

Friday, P. C., & Hage, J. (1976). Youth crime in postindustrial societies: An integrated perspective. Criminology, 14, 347-368.

Fundudis, T., Kolvin, I., & Garside, R. F. (1980). A follow up of speech retarded children. In L. A. Hersov & M. Berger (Eds.), Language and language disorders in childhood (pp. 97-113). Oxford: Pergamon Press. [Book supplement to to the Journal of Child Psychology and Psychiatry, No. 2]

Garmezy, M. (1985). Stress-resistant children: The search for protective factors. In J. E. Stevenson (Ed.), Recent research in developmental psychopathology (pp. 213-233). Oxford: Pergamon Press. [Book supplement to the Journal of Child Psychology and Psychiatry and Psychiatry, No. 4]

Garmezy, N. (1987). Stress, competency and development: continuities in the study of schizophrenic adults, children vulnerable to psychopathology and the search for stress-resistant children. American Journal of Orthopsychiatry, 57, 159-174.

Garmezy, N., & Rutter, M. (1983). Stress, coping and development in children. New York: McGraw Hill Book Co.

Garmezy, N., & Rutter, M. (1985). Acute reactions to stress. In M. Rutter & L. Herson, (Eds.), Child psychiatry: Modern approaches (2nd ed., pp. 152-176). Oxford: Blackwell Scientific Publication.

Goldin, L. R., & Gershon, E. S. (1989). Power of genetic linkage: Studies for heterogeneous disorders. In B. Lerer & E. S. Gershon (Eds.), New directions in affective disorders. New York: Springer-Verlag.

Goldman-Rakic, P. A. (1987). Development of cortical circuitry and cognitive function. Child Development, 58, 601-622.

Goldman-Rakic, P. S., Isseroff, A., Schwartz, M. L., & Bugbee, N. M. (1983). The neurobiology of cognitive development. In P. Mussen (Ed.), Handbook of child psychology: biology and infancy development (pp. 281-344). New York: Wiley.

Goldsmith, H. H. (1988). Developmental behavioral genetics: Mapping the effects of genes and environments. In R. Vasta (Ed.), Annals of child development (Vol. 5, pp. 187-227). Greenwich, CT: JAI Press.

Goldsmith, H. H., & Alansky, J. (1987). Maternal and infant temperamental predictors of attachment: A meta-analytic review. Journal of Consulting and Clinical Psychology, 55, 805-816.

Goldsmith, H. H., & Campos, J. J. (1986). Fundamental issues in the study of early temperament: The Denver twin temperament study. In M. E. Lamb, A. L. Brown, & B. Rogoff (Eds.), Advances in developmental psychology (Vol. 4, pp. 231-283). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Goldsmith, H. H., & Rothbart, M. K. (1988). The laboratory temperament assessment battery (LAB-TAB): Locomotor version, edition 1.2. Oregon Center for the Study of Emotion (Technical Report No. 8-01).

Greenough, W. T., Hwang, H. M., & Govman, C. (1985). Evidence for active synapse formations or altered postsynaptic metabolism in visual cortex of rats reared in complex environments. Proceedings of the National Academy of Science USA, 82, 4549-4552.

Guillemenault, C. (Ed.) (1987). Sleep and its disorders in children. New York: Raven Press.

Haber, S. N., Kowall, N. W., Vonsattel, J. P., Bird, E. D., & Richardson, E.P., Jr. (1986). Gilles de la Tourette's syndrome: A postmortem neuropathological and immunohistochemical study. Journal of Neurological Science, 75(2), 225-241.

Harlow, H. F. (1958). The nature of love. American Psychologist, 13, 673-685.

Harlow, H. F., & Harlow, M. K. (1969). Effects of various mother-infant relationships on rhesus monkey behaviors. In B. M. Foss (Ed.), Determinants of infant behavior (Vol. 4, pp. 15-36). London: Methuen.

Harter, S. (1982). The perceived competence scale for children. Child Development, 53, 87-97.

Henker, B., & Whalen, C. K. (1989). Hyperactivity and attention deficits. American Psychologist, 44(2), 216-223.

Hubel, D. H., & Wiesel, T. N. (1962). Receptive fields, binocular interaction and functional architecture in the cat's visual cortex. Journal of Physiology, 160, 106-154.

Kagan, J., Reznick, J. S., Snidman, N., Gibbons, J., & Johnson, M. O. (1988). Childhood derivatives of inhibition and lack of inhibition to the unfamiliar. Child Development, 59, 1580-1589.

Kashani, J. H., McGee, R. O., Clarkson, S. E., Anderson, J. C., Walton, L. A., Williams, S., Silva, P. A., Robins, A. J., Cytryn, L., & McKnew, D. H. (1983). Depression in a sample of 9-year old children: Prevalence and associated characteristics. Archives of General Psychiatry, 40(11), 1217-1223.

Kazdin, A. E., Moser, J., Colbus, D., & Bell, R. (1985). Depressive symptoms among physically abused and psychatrically disturbed children. Journal of Abnormal Psychology, 94, 298-307.

Kovacs, M. (1989). Affective disorders in children and adolescents. American Psychologist, 44(2), 209-215.

Kovacs, M., Feinberg, T. L., Crouse-Novak, M. A., & Paulauskos, S. A., Finkelstein, R. (1984). Depressive disorders in childhood: I. A longitudinal prospective study of characteristics and recovery. Archives of General Psychiatry, 41, 229-237.

Kurlan, R., Behr, J., Medved, L., Shoulson, I., Pauls, D., & Kidd, K. K. (1987). Severity of Tourette's syndrome in one large kindred: Implication for determination of disease prevalence rate. Archives of Neurology, 44(3), 268-269.

Lander, E. S., & Borstein, D. (1986). Mapping complex genetic traits in humans: New strategies using a complete RFLP linkage map. Cold Spring Harbor Symposium on Quantitative Biology, 51, 49-62.

Laplane, D., Widlocher, D., Pillon, B., Baulac, M., & Binoux, F. (1981). Comportement compulsif d'allure obsessionnelle par necrose circonscrite bilaterale pallido-striatale. Encephalopathie par pique de guepe. [Obsessional-type compulsive behavior caused by bilateral circumscribed pallidostriatal necrosis. Encephalopathy caused by a wasp sting.] Revue Neurologique [Paris], 137(4), 269-276.

Leckman, J. F., Towbin, K. E., Ort, S. I. (1988). Clinical assessment of tic disorder severity. In D. J. Cohen, R. D. Bruun, & J. F. Leckman (Eds.), Tourette's syndrome and tic disorders: Clinical understanding and treatment (pp. 55-78). New York: John Wiley & Sons.

Leckman, J. F., Walkup, J. T., Riddle, M. A., Towbin, K. E., & Cohen, D. J. (1987). Tic disorders. In H. Y. Meltzer, W. E., Bunney, J. T. Coyle, R. L. Davis, I. J. Kopin, C. R. Schuster, R. I. Shader, & G. M. Simpson (Eds.), Psychopharmacology: The third generation of progress (pp. 1239-1246). New York: Raven Press.

Leedmerer, K. (1972). Genetics in American society. Baltimore: John Hopkins University Press.

Liberman, I. Y., Shankweiler, D., Camp, L., Blachman, B., & Werfelman, M. (1980). Steps toward literacy: A linguistic approach. In P. J. Levinson & C. Sloan (Eds.), Auditory processing and language: Clinical and research perspectives (pp. 189-215). New York: Grune and Stratton.

Link, B. G., Dohrenwend, B. P., & Skodol, A. E. (1986). Socioeconomic status and schizophrenia: Noisome occupational characteristics as a risk factor. American Sociological Review, 51, 242-258.

Main, M. (1981). Avoidance in the service of attachment: A working paper. In K. Immelmann, G. Barlow, L. Petrinovich, & M. Main (Eds.), Behavioral development: The Bielefeld interdisciplinary project (pp. 651-693). New York: Cambridge University Press.

Maisami, M., Sohmer, B. H., & Coyle. J. T. (1985). Combined use of tricyclic antidepressants and neuroleptics in the management of terminally ill children: A report on three cases. Journal of the American Academy of Child Psychiatry, 4, 487-489.

Masten, A., & Garmezy, N. (1985). Risk, vulnerability, and protective factors in developmental psychopathology. In B. B. Lahey & A. E. Kazdin (Eds.), Advances in clinical child psychology (Vol. 8, pp. 1-52). New York: Plenum Press.

McKusick, V. A. (1989). Mapping and sequencing the human genome. The New England Journal of Medicine, 320(14), 910-915.

Merikangas, K. R., Bromet, E. J., & Spiker, D. (1983). Assortative mating, social adjustment and course of illness in primary affective disorder. Archives of General Psychiatry, 40, 795-800.

Miyake, K., Chen, S., & Campos, J. J. (1985). Infant temperament, mother's mode of interaction, and attachment in Japan: An interim report. In I. Bretherton & E. Waters (Eds.), Growing points of

attachment theory and research. Monographs of the Society for Research in Child Development, 50, 276-297.

Montgomery, M. A. Clayton, P. J., Friedhoff, A. J. (1982). Psychiatric illness in Tourette syndrome patients and first-degree relatives. In A. J. Friedhoff & T. N. Chase (Eds.), Gilles de la Tourette syndrome. New York: Raven Press.

Mueller, E., & Rich, A. (1976). Clustering and socially-directed behavior in a playgroup of one-year old boys. Journal of Child Psychology and Psychiatry, 17, 315-322.

Mueller, E., & Silverman, N. (1989). Peer relations in maltreated children. In D. Cicchetti & V. Carlson (Eds.), Child maltreatment: Theory and research on the causes and consequences of child abuse and neglect (pp. 529-578). New York: Cambridge University Press.

Murphy, B. C., & Shinyei, M. J. (1976). Cons and straights: Comparative free behavior rates of 25 delinquents and 25 non-delinquents matched for age and legal occupation in British Columbia, Canada. Canadian Journal of Criminology and Corrections, 18, 343-361.

Mussen, P. H. (Ed.). (1983). Handbook of child psychology: Vol. III. Cognitive development. New York: John Wiley and Sons.

Nee, L., Polinsky, R., Ebert, M. (1982). Tourette syndrome: Clinical and family studies. In A. J. Friedhoff & T. N. Chase (Eds.), Gilles de la Tourette's syndrome. New York: Raven Press.

Neville, H. J. (1985). Effects of early sensory and language experience on the development of the human brain. In J. Mehler & R. Fox (Eds.), Neonate cognition: Beyond the blooming, buzzing confusion (pp. 349-363). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Newport, E. L. (1984). Constraints on learning. Studies in the acquisition of American sign language. Papers and Reports on Child Language Development, 23, 1-22.

Newport, E., & Supalla, T. (1988). A critical period effect in the acquisition of a primary language. Manuscript submitted for publication.

Pardes, H., Kaufmann, C. A., Pincus, H. A., & West A. (1989). Genetics and psychiatry: Past discoveries, current dilemmas, and future directions. American Journal of Psychiatry, 146(4), 435-443.

Pauls, D. L., & Leckman, J. F. (1986). The inheritance of Gilles de la Tourette's syndrome and associated behaviors: Evidence for autosomal dominant transmission. New England Journal of Medicine, 315, 993-997.

Pelton, L. (1978). Child abuse and neglect: The myth of classlessness. American Journal of Orthopsychiatry, 48, 608-617.

Piven, J., Gayle, J., Chase G., Fink, B., Landa, R., Wzorek, M. M., & Folstein, S. E. (in press). A family history study of neuro-psychiatric disorders in the adult siblings of autistic individuals. Journal of the American Academy of Child and Adolescent Psychiatry.

Plomin, R. (1986). Development, genetics and psychology. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Plomin, R. (1989). Environment and genes: Determinants of behavior. American Psychologist, 44(2), 105-111.

Plomin, R., DeFries, J. C., & Fulker, D. W. (1988). Nature and nurture during infancy and early childhood. New York: Cambridge University Press.

Poizner, J., Klima, E. S., & Bellugi, U. (1987). What the hands reveal about the brain. Cambridge, MA: MIT Press/Bradford Books.

Polansky, N. A., Chalmos, M. A., Buttenweiser, E., & Williams, D. P. (1981). Damaged parents, damaged children: An Anatomy of Child Neglect. Chicago: University of Chicago Press.

Price, R. A., Kidd, K. K., Cohen, D. J., Pauls, D. L., & Leckman, J. F. (1985). A twin study of Tourette syndrome. Archives of General Psychiatry, 42(8), 815-820.

Puig-Antich, J., Goetz, D., Davies, M., Kaplan, T., Davies, S., Ostrow, L., Asnis, L., Twomey, J., Iyengar, S., & Ryan, N. (1989). A controlled family history study of prepubertal major depressive disorder. Archives of General Psychiatry, 46, 406-418.

Puig-Antich, J., Perel, J. M., Lupatkin, W., Chambers, W. J., Tabrizi, M. A., King, J., Goetz, R., Davies, M., & Stiller, R. L. (1987). Imipramine in prepubertal major depressive disorders. Archives of General Psychiatry, 44, 81-89.

Puig-Antich, J., & Weston, B. (1983). The diagnosis and treatment of major depressive disorder in childhood. Annal Review of Medicine, 34, 231-245.

Radke-Yarrow, M., Cummings, E. M., Kuczynski, L., & Chapman, M. (1985). Patterns of attachment in two-and-three-year-olds in

normal families and families with parental depression. Child Development, 56, 884-893.

Reiss, A. J., Jr., & Rhodes, A. L. (1964). An empirical test of differential association theory. Journal of Research in Crime and Delinquency, 1, 5-18.

Reite, M., & Field, T. (Eds.). (1985). Psychobiology of attachment and separation. New York: Academic Press.

Richman, N., Stevenson, J., & Graham, P. J. (1975). Prevalence of behavior problems in 3-year-old children: An epidemiological study in a London borough. Journal of Child Psychology and Psychiatry, 16, 277-287.

Robins, L. N., West, P. A., & Herjanic, B. C. (1975). Arrests and delinquency in two generations: A study of black urban families and their children. Journal of Child Psychology and Psychiatry, 16, 125-140.

Rosenbaum, J. F., Biederman, J. Gersten, M., Hirshfeld, D. R., Meminger, S. R., Herman, J. B., Kagan, J., Reznick, J. S., & Snidman, N. (1988). Behavioral inhibition in children of parents with panic disorder and agoraphobia: A controlled study. Archives of General Psychiatry, 45, 463-470.

Rosenzweig, M. R. (1979). Responsiveness of brain size to individual experience: Behavioral and evolutionary implications. In M. E. Hahn, C. Jensen, & B. C. Dudek (Eds.), Development and evolution of brain size, behavioral implications. New York: Academic Press.

Rothbart, M. K., & Posner, M. I. (1985). Temperament and the development of self-regulation. In L. C. Hartlage & C. F. Telzrow (Eds.), The neuropsychology of individual differences: A developmental perspective. New York: Plenum.

Rutter, M. (1979). Protective factors in children's responses to stress and disadvantage. In M. W. Kent & J. E. Rolf (Eds.), Primary prevention of psychopathology: Social Competence in Children (Vol. 3, pp. 49-74). Hanover, NH: University Press of New England.

Rutter, M. (1980). Changing youth in a changing society. Cambridge, MA: Harvard University Press.

Rutter, M. (1981). Maternal deprivation reassessed (2nd ed.). Harmandsworth, Middlesex, England: Penguin Books.

Rutter, M., Cox, A., Tupling, C., Berger, M., & Yule, W. (1975). Attainment and adjustment in two geographical areas: Vol. 1. The

prevalence of psychiatric disorder. British Journal of Psychiatry, 126, 493-509.

Rutter, M., & Quinton, D. (1977). Psychiatric disorder: Ecological factors and concepts of causation. In H. McGurk (Ed.), Ecological factors in human development (pp. 173-187). North Holland: Amsterdam.

Rutter, M. R., & Garmezy, N. (1983). Childhood psychopathology. In M. Hetherington & P. Mussen (Eds.), Manual of child psychology (Vol. 4, 4th ed., pp. 775-911). New York: Wiley.

Salzinger, S., Kaplan, S., Pelcovitz, D., Samit, C., & Krieger, R. (1984). Parent and teacher assessment of children's behavior in child maltreating families. Journal of the American Academy of Child Psychiatry, 23, 458-464.

Sameroff, A., & Seifer, R. (in press). Early contributions to developmental risk. In J. Rolf, A. Masten, D. Cicchetti, K. Nuecherlein, & S. Weintraub (Eds.), Risk and protective factors in the development of psychopathology. New York: Cambridge Press.

Schanberg, S., & Field, T. (1987). Sensory deprivation stress and supplemental stimulation in the rat pup and preterm human neonate. Child Development, 58, 1431-1447.

Schneider-Rosen, K., & Cicchetti, D. (1984). The relationship between affect and cognition in maltreated infants: Quality of attachment and the development of visual self-recognition. Child Development, 55, 648-658.

Schneider-Rosen, K., Braunwald, K., Carlson, V., and Cicchetti, D. (1985). Current perspectives in attachment theory: Illustration from the study of maltreated infants. In I. Bretherton & E. Waters (Eds.), Growing points in attachment theory and research. Monographs of the Society for Research in Child Development, 50 (Serial No. 209), 194-210.

Schorr, L. B. (1988). Within our reach: Breaking the cycle of disadvantage. New York: Doubleday.

Segal, J., & Yahraes, H. (1978). A child's journey: Forces that shape the lives of our young. New York: McGraw-Hill Book Company.

Shapiro, A. K., Shapiro, E. S., Bruun, R. D., & Sweet, R. D. (1978). Gilles de la Tourette syndrome. New York: Raven Press.

Shapiro, A. K., Shapiro, E. S., Young, J. G., & Feinberg, T. E. (Eds.). (1988). Gilles de la Tourette syndrome (2nd ed.). New York: Raven Press.

Shaw, J. A. (1988). Childhood depression. Medical Clinics of North America, 72(4), 831-845.

Shaywitz, S. E., & Shaywitz, B. A. (1985). Attention deficit disorders. In J. O. Cavenar (Ed.), Psychiatry (Vol. 2, Ch. 36, pp. 1-15). Philadelphia: Lippincott.

Silva, P. A., McGee, R., & Williams, S. M. (1983). Developmental language delay from three to seven and its significance for low intelligence and reading difficulties at seven. Developmental Medicine and Child Neurology, 25, 783-793.

Smetana, J. G., & Kelly, M. (1989). Social cognition in maltreated children. In D. Cicchetti & V. Carlson (Eds.), Child maltreatment: Research and theory on the consequences of child abuse and neglect (pp. 620-646). New York: Cambridge University Press.

Spitz, R. (1946). Anaclitic depression. In: Psychoanalytic study of the child (Vol. 2 , pp. 313-342). New York: International University Press.

Sroufe, L. A. (1979). Socioemotional development. In J. Osofsky (Ed.), Handbook of infant development. New York: Wiley.

Sroufe, L. A. (1983). Infant-caregiver attachment and patterns of adaptation in preschool: The roots of maladaptation and competence. In M. Perlmutter (Ed.), Minnesota Symposium in Child Psychology, (Vol. 16, pp. 41-81).

Sroufe, L. A. (1985). Attachment classification from the perspective of infant-caregiver relationships and infant temperament. Child Development, 56, 1-14.

Sroufe, L. A., & Waters, E. (1977). Attachment as an organizational construct. Child Development, 48, 1184-1199.

Suomi, S. J. (1986). Anxiety-like disorders in young primates. In R. Gittelman (Ed.), Anxiety disorders of childhood (pp. 1-23). New York: Guilford Press.

Tallal, P. (1988). Developmental language disorders. In J. S. Kavanagh & T. J. Truss, Jr. (Eds). Learning disabilities: Proceedings of the national conference (pp. 181-272). Baltimore, MD: York Press.

Tallal, P., Dukette, D., & Curtiss, S. (1989). Emotional profiles of language-impaired children. Development in Psychopathology, 1, 51-67.

Tallal, P., & Stark, R. E. (1982). Perceptual/motor profiles of reading impaired children with or without concomitant oral language deficits. Annals of Dyslexia, 32, 163-176.

Thomas, A., & Chess, S. (1977). Temperament and development. New York: Brunner/Mazel.

Thomas, A., Chess, S., & Birch, J. G. (1968). Temperament and behavior disorders in children. New York: New York University Press.

U.S. Department of Health and Human Services (1988). Study findings: Study of national incidence and prevalence of child abuse and neglect (DHHS Publication No. (OHDS) 20-01099). Washington, DC: Author.

Vaughn, B. E., Block, J. H., & Block, J. (1988). Parental agreement on child rearing during early childhood and the psychological characteristics of adolescents. Child Development, 59, 1020-1033.

Wald, M., Carlsmith, J., & Leiderman, P. H. (Eds.). (1988). Protecting abused/neglected children: A comparison of home and foster placement. Stanford, CA: Stanford University Press.

Weissman, M., M., Prusoff, B. A., Gammon, G. D., Merikangas, K. R., Leckman, J. F. & Kidd, K. K. (1984). Psychopathology in the children (ages 6-18) of depressed and normal parents. Journal of the American Academy of Child Psychiatry, 23, 78-84.

Wilson, R. S., & Matheny, A. P., Jr. (1983). Assessment of temperament in infant twins. Developmental Psychology, 19, 172-183.

Wilson, W. J. (1987). The truly disadvantaged: The inner city, the underclass and public policy. Chicago: University of Chicago Press.

Wolfe, D. A. (1987). Child abuse. Newbury Park, CA: Sage Publications.

Wolff, S., Narayan, S., & Moyes, B. (1988). Personality characteristics of parents of autistic children: A controlled study. Journal of Child Psychology and Psychiatry, 29, 143-153.

Zigmond, M. J., Acheson, A. L., Stachowiak, M. K., & Stricker, E. M. (1984). Neurochemical compensation after nigrostriatal bundle injury in an animal model for preclinical parkinsonism. Archives of Neurology, 41, 856-861.

CHAPTER 4

INTERVENTIONS FOR CHILDHOOD MENTAL DISORDERS

This chapter focuses on interventions that mental health professionals use in treatment or prevention of childhood mental disorders. These include various forms of psychotherapy and pharmacotherapy that are offered in multiple settings, including outpatient clinics, mental health facilities, and psychiatric hospitals. The chapter documents progress made in developing and evaluating treatments and preventive interventions for childhood mental disorders. Finally, it presents the committee's assessment of promising avenues for future research.

PROGRESS IN TREATING CHILDHOOD MENTAL DISORDERS

Treatments for children encompass a variety of interventions that are designed to reduce the number and severity of symptoms and to increase a child's ability to function in society. Psychotherapeutic interventions rely mainly on planned interactions between a therapist and the child or family to alter affect (emotions), thoughts (cognitions), and behavior (actions). Psychopharmacological interventions use medications to affect symptoms and improve functioning. Available medications work through a variety of mechanisms. Any treatment must be given within a context; at times, the context itself is a critical part of the intervention.

Psychotherapeutic Interventions

More than 230 psychotherapeutic techniques are in use for treating children and adolescents with mental disorders (Kazdin, 1988). They differ widely in focus (for example, on various psychological processes, behavior, or family interactions), in the manner in which they are conducted (for example, with the individual, in groups, or with the family), and the settings in which they are provided (for example, in a therapist's treatment office, at home or school, or in the hospital). Although no system exists yet to classify treatment approaches, major categories include individual psychotherapy, group psychotherapy, behavior therapy, cognitive therapy, family therapy, parent training, and institutional treatment (Hoghughi, Lyons, Muckley, and Swainston, 1988; Johnson, Rasbury, and Siegel, 1986). Table 4-1 highlights major classes of treatment and their focus.

Each treatment category in the table includes several similar techniques that can be applied to a wide spectrum of clinical

TABLE 4-1: Psychosocial Therapies for Children and Adolescents

Types of Treatment	Key Processes	Focus
Child-Focused Treatments		
Individual Psychotherapy	Relationship with the therapist is the primary medium through which change is achieved. Treatment provides a corrective emotional experience by providing insight and exploring new ways of behaving.	Focus on personality, psychological processes and interpersonal relationship as a means of reducing symptoms and improving functioning.
Group Psychotherapy	Relationship with the therapist and peers as part of the group. Group processes emerge to provide children with experiences and feelings of others and opportunities to test their own views and behaviors.	Processes of individual therapy, as noted above, serve as part of the focus in addition to special processes that emerge as part of the group such as cohesion, peer influence, vicarious experience.
Behavior Therapy	Learning of new behaviors through direct training, via modeling, reinforcement, practice and role playing. Training in the situations (e.g., at home, in the community) where the problematic behaviors occur.	Focus on specific behaviors that are included in the presenting problems; treatment is designed to alter these behaviors directly.
Cognitive Therapy	Teach problem-solving skills to children by engaging in a step-by-step approach to interpersonal situations. Use of modeling, practice, and internal dialogue to develop problem-solving skills.	Focus on thoughts, attributions, perceptions, and other cognitive processes that are considered to underlie interpersonal problems.

Family-Focused Treatments		
Family Therapy	Insight-oriented communication between family members; explicit use of problem-solving and negotiation techniques.	Rather than the identified patient, the family serves as focus: its organization and interpersonal dynamics, and the roles played by each member.
Parent Training	Direct training of parents to reinforce socially desirable behavior in their children. Explicit use of social learning techniques to influence the child.	Interactions in the home, especially those involving coercive exchanges.
Residential Treatments		
Residential Treatment Centers, Hospitals	Processes of other techniques apply. Also, separation of the child from parents or removal from the home situation may help reduce crises or adverse influences that contribute to the clinical problem.	Means of administrating other techniques in day treatment or residential setting. Foci of other treatment methods apply.
Community-Based Treatments		
Community-wide Interventions	Activities to develop prosocial behavior and connections with peers.	Focus on activities and community programs to foster competence and adaptive social behavior.

problems. For example, behavior therapy encompasses procedures for treating attention-deficit disorder, conduct disorder, eating disorders, anxiety disorders, dysfunctions associated with mental retardation, and others.

Until relatively recently, psychotherapy for children and adolescents had been studied only sporadically. For example, reviews of research available in the 1950s and 1960s included fewer than 25 outcome studies (Levitt, 1957, 1963). There was considerable debate regarding whether these few studies were done well enough to permit clear conclusions (Heinicke and Goldman, 1960; Hood-Williams, 1960). Within the last 5 to 10 years, however, publication of over 100 well-controlled outcome studies has made it possible to draw much clearer conclusions about which interventions are effective in what settings.

Recent reviews of research on psychotherapeutic interventions with children have compared results across available studies to estimate the efficacy of such treatments (e.g., Casey and Berman, 1985; Weisz, Weiss, Alicke, and Klotz, 1987). To date the majority of studies have focused on cognitive and behavioral treatments. Such reviews support two general conclusions about these treatment approaches: (1) psychotherapy for children and adolescents is better than no treatment, and (2) the positive impact of treatment closely parallels the effects noted in studies of treatment with adults. For many of the treatments commonly used in clinical practice, such as insight-oriented, family, play, and relationship therapies, relatively few well-controlled studies have been reported, so analogous assessments are not possible.

The range of available therapy techniques and the progress in research on them can be illustrated with a brief summary of the highly promising treatments developed for one condition, conduct disorder (Kazdin, 1985). As described earlier (Chapter 2), children with a diagnosis of conduct disorder evince a wide range of antisocial behaviors such as aggression, stealing, and vandalism. They also show dysfunctions in their social behaviors, academic performance, and cognitive processes. Often, these children continue their antisocial behavior into adulthood, and they may have other mental disorders.

In one therapeutic technique, parent management training, parents are taught to interact differently with their child. This training is based on observations that in many families, behavior problems develop inadvertently and are sustained by maladaptive parent-child interactions. A number of well-controlled studies demonstrate that parent management training can improve child behavior at home and at school, with reductions in antisocial, oppositional, and related behavior over the course of treatment (Patterson, 1982; Patterson, Chamberlain, and Reid, 1982; Barkley, 1981). Moreover, these changes often surpass those achieved with other forms of treatment such as

individual counseling and family therapy. In addition, the behavior of siblings also improves in many cases, reducing their risk of developing conduct disorder (Arnold, Levine and Patterson, 1975).

Parent management training is not invariably effective. For parents with severe social disadvantage, psychopathology, and marital discord, benefits of training may be short-lived. Moreover, in severely dysfunctional families, a parent may not agree to participate in treatment. Other treatments have been developed for use at different points of intervention in serious antisocial behavior.

Occasionally, interventions are used in the schools or in the community at large. In a study of about 600 children conducted in England between 1972 and 1979, several different school-based interventions were provided for maladjusted children (Kolvin et al., 1981). The study was unique in including children with either disruptive behavior problems such as antisocial acts or emotional problems such as anxiety or social withdrawal, and children of different ages (7 to 8 and 11 to 12). Various interventions were evaluated, among them group therapy, parent and teacher counseling, and behavior modification in the classroom. The results are not easily summarized, given the complexity of the study. Still, overall outcomes for the different treatments were positive, and treated children did better than untreated children for at least 18 months after treatment was completed.

Community-based interventions are often conducted in local recreational or youth centers where activity programs are already underway. Integration of treatment in such programs increases the likelihood that improvements in behavior will carry over to the community settings. Community approaches emphasize the advantages of treating delinquent youths together with nondelinquent peers to avoid or counteract the strong, negative peer group influences that ordinarily might maintain antisocial behavior.

Community-based interventions have shown considerable promise. In one program in St. Louis, a large-scale intervention program was integrated with the usual activities of a community center (Feldman, Caplinger, and Wodarski, 1983). Participants were youths (ages 8 to 17) who were referred for antisocial behavior and youths without behavioral problems who normally attended the center's programs. Alternative treatments (including group social work and behavior modification), the effects of various levels of therapist experience, and different ways of composing the groups were also evaluated. After one year, significant reductions in antisocial behavior were observed, especially among those youths who participated in groups with youths who had no apparent problems.

Analogous progress could be illustrated with research on psychotherapeutic interventions for many other disorders, including

pervasive developmental disorders, attention-deficit disorder, eating disorders, sleep disorders, mood disorders, and anxiety disorders (see Bornstein and Kazdin, 1985; Morris and Kratochwill, 1983). More precise and accurate initial diagnoses and ongoing symptom assessment, among others, have done much to advance such research.

Psychopharmacological Interventions

Research on the use of medications to treat mental disorders of children and adolescents has expanded worldwide during the past decade (Campbell, Green and Deutsch, 1985; Weiner, 1985). Treatments either have been developed specifically for children or have been adapted from adult psychiatry. The effectiveness of some of these treatments for specific disorders has been assessed critically, but many are widely used despite scant information about potential short- and long-term side effects or the particular treatment's effectiveness or appropriateness for specific clinical conditions or age groups.

Pharmacotherapy is useful in treating or alleviating disabling symptoms of a number of childhood mental disorders. Table 4-2 presents a number of areas of active research from which positive or equivocal evidence has emerged. The effects, for example, of stimulants on attention or of neuroleptics on excessive self-destructiveness, can be quite beneficial. Medications can alter such crippling symptoms as self-directed aggressiveness, stereotypic movements, and obsessive rituals.

In daily clinical practice, drugs are usually prescribed in conjunction with other treatments. In clinical research, however, one psychoactive drug is typically compared to another or to a placebo control (see Campbell et al., 1985). Only rarely has a psychoactive drug been compared to or combined with a psychosocial treatment (specifically, behavior modification and cognitive therapy) (Abikoff and Gittelman, 1985; Campbell et al., 1978).

The advent of chlorpromazine, imipramine, and lithium altered the practice of adult psychiatry. Research on such drugs also led to advances in classification and diagnosis of mental disorders (American Psychiatric Association, 1980, 1987; Feighner et al., 1972; Spitzer, Endicott, and Robins, 1978) and to the development of rating instruments for diagnosis and for treatment evaluation. The success of drug treatments also led to a still-expanding interest in the neurobiochemical basis of mental disorders. Similar contributions from studies of the effects of drugs on child mental disorders have come more slowly, but good, relevant research has begun to emerge, especially during the past five years (Campbell and Spencer, 1988). Advances in psychopharmacology and promising areas for further research can be illustrated in several areas.

TABLE 4-2. Pharmacotherapies for Child and Adolescent Disorders: Areas of Active Research

Types of Drug	Syndromes Investigated	Illustrative Target Symptoms
Neuroleptics	(a) Tourette's Disorder	Motor and vocal tics
	(b) Autism	Stereotypies, hyperactivity, withdrawal attentional and cognitive problems
	(c) Schizophrenia	Hallucinations and delusions
Stimulants	Attention-deficit Hyperactivity Disorder	Hyperactivity, impulsivity, disturbance of attention
Antidepressants (Tricyclics)	(a) Major Depression	Disturbances of mood, appetite, and sleep
	(b) Attention-deficit Hyperactivity Disorder	Hyperactivity, impulsivity, disturbance of attention
Lithium carbonate	Conduct Disorder, Aggressive Type	Aggressiveness, explosiveness
Fenfluramine	Autism	Stereotypies, hyperactivity, withdrawal attentional and cognitive problems
Beta Blockers	Mental Retardation	Self-injurious behavior
Naltrexone	Autism	Stereotypies, withdrawal, self-injurious behavior; inhibited verbal production
Carbamazepine	Conduct Disorder, Aggressive Type	Aggressiveness, explosiveness

Attention-deficit Hyperactivity Disorder

Medications have been used to treat attention-deficit hyperactivity disorder (ADHD) for over 50 years. Stimulants (dextroamphetamine, methylphenidate, pemoline), improve attention and reduce hyperactivity, impulsivity, and distractibility. Imipramine, a tricyclic antidepressant, has similar effects on behavior, but its effects appear to be weaker and may not continue over time (Quinn and Rapoport, 1975; Rapoport, Quinn, Bradbard, Riddle and Brooks, 1974). Past studies of stimulants suggested that they have only a negligible positive effect on school achievement or performance on measures of intelligence (Thurber and Walker, 1983). However, more recent studies indicate that methylphenidate administration improves academic performance (Douglas, Barr, O'Neill, and Britton, 1986) and academic achievement (Firestone, Kelly, Goodman and Davey, 1981) and has a positive effect on the child's social behavior (for review, see Gittelman-Klein, 1987). The combination of stimulant and psychosocial therapies has been investigated in several studies. A recent review (Gittelman-Klein, 1987) concludes that the psychosocial treatments do not significantly augment the effects of stimulants, but further systematic research is required.

The usefulness of stimulant medication for most ADHD youngsters--at least in the short term--is well established (Wiener, 1985; Campbell et al., 1985). However, concerns have been expressed in lay and professional circles about how the diagnosis is made and about the prescribing of stimulant medication. Substantially more research is needed to address these issues; this would provide a basis for more widely accepted guidelines for the use of the ADHD diagnosis and for appropriate treatment of youngsters with this disorder.

Autism

Autism, a pervasive developmental disorder, is described in Chapter 2. For many children with autism, the goal of treatment is to decrease or to control the behavioral abnormalities, to create more adaptive behaviors, and to develop self-care, language, and speech, skills that are often rudimentary or nonexistent.

Some investigators have reported that administration of haloperidol, a potent dopamine antagonist, is associated with clinically and statistically significant decreases of symptoms in autistic preschool children (Anderson et al., 1984, 1989; Campbell et al., 1978; Cohen et al., 1980) and facilitation of learning in the laboratory (Anderson et al., 1984; Campbell et al., 1978). In these studies the dose was individually regulated and given for four to eight weeks. The symptom reduction included effects on withdrawal, stereotypes, hyperactivity, and irritability.

Treatment with haloperidol was also compared to behavior therapy and to the combination of both. In a well-designed and placebo-controlled study, involving 40 hospitalized children, haloperidol alone decreased maladaptive behaviors, but the combination of haloperidol and behavior therapy, focusing on language acquisition, resulted in increases of word acquisition (Campbell et al., 1978). This is an important finding, since acquisition of communicative speech at an early age is the single most important predictor of outcome in autistic children. In some case reports haloperidol may remain effective when given on a long-term basis, for 6 months (Perry et al., 1989), and up to 4-1/2 years. Although no adverse effects on IQ or linear growth have been reported, long-term administration of haloperidol is associated with a serious though reversible side effect, dyskinesia, in 30 percent of children and with an irreversible movement disorder, tardive dyskinesia, in a few (Campbell, Adams, Perry, Spencer, and Overall, 1988; Gualtieri, Schroeder, Hicks, and Quade, 1986).

It is important to emphasize that, in clinical care, gains made by most autistic children with medication now available are modest, at best. It is often very difficult for clinicians to determine for which patients the benefits of drug administration outweigh the risks. More effective drugs, hopefully addressing the underlying defect, continue to be sought. Initial promising results with fenfluramine (which decreases brain serotonin) led to the first major collaborative drug study in child psychiatry (Ritvo et al., 1986; Campbell et al., 1988). Unfortunately that study did not reveal fenfluramine to be an effective treatment for autism, at least for the majority of patients. Very recently, it has been reported that naltrexone (which blocks the action of endorphins) can help decrease self-abusive behavior (Bernstein, Hughes, Mitchell, and Thompson, 1987) and may have positive effects on some symptoms of autism, such as decreasing stereotypes and increasing verbal productions (Campbell et al., 1989).

Mental Retardation with Severe Aggressiveness and Self-injurious Behavior

The majority of retarded children do well without medication. However, many retarded children with severe self-injurious behavior fail to respond to behavioral interventions and are given a trial of a psychoactive medication. No systematic research has been done in this very important area. A few uncontrolled studies done on a small number of subjects suggest that lithium (Dostal, 1972; Ziring and Teitelbaum, 1980), the beta blockers (propranolol, nadolol and atenolol) (Ratey et al., 1986), or the opiate antagonist naltrexone (Herman et al., 1987), may be useful for this devastating condition. These preliminary findings await critical assessment in carefully designed large clinical trials.

Conduct Disorder with Aggressiveness

A number of reports suggest that carbamazepine, an anticonvulsant, has psychoactive properties and that it has beneficial effects on children with behavioral problems characterized by aggressiveness and explosiveness (for review, Evans, Clay, and Gualtieri, 1987; Remschmidt, 1976). However, because these findings are based on flawed research designs, no definite conclusions can be drawn. The efficacy and safety of carbamazepine remains to be assessed, as does its usefulness in the treatment of children who fail to respond to psychosocial therapies. Double blind and placebo-controlled studies have suggested the possible therapeutic efficacy of lithium carbonate in this population, but, as with carbamazepine, a full assessment is still needed (Campbell et al., 1984).

Tourette's Disorder and Childhood Depressive Disorder

Research on pharmacological treatment approaches to these disorders is described in Chapter 3.

Community Support Services and Systems that Provide Care

Children with mental disorders come into contact with many community systems other than the mental health professions. Among them are programs included in the criminal justice system, general health care services, education and special education, foster care programs, and social services (Hoghughi et al., 1988; Tuma, 1989). Often, such programs are intended to reduce the burden on society when effective interventions for the disorder itself are unavailable or ineffective.

Aggressive behavior, stealing, fire-setting, substance abuse, and driving while intoxicated are prime examples of deviance that special programs in the criminal justice system are designed to address. Many of these behaviors may occur as a result of or at least in the context of childhood mental disorders.

Health services address a wide range of mental and behavioral problems of youth. For example, many hyperactive children are diagnosed as having attention-deficit hyperactivity disorder by pediatricians who prescribe medication for them. Other children who are treated in medical settings for handicapping physical conditions and chronic diseases may also be involved in programs directed toward ameliorating or limiting the psychological harm that these conditions often produce.

Education and special education programs focus on deviant and dysfunctional behavior. State and federal laws require that children and adolescents with special needs related to their physical,

behavioral, and emotional problems receive services that address their abilities and dysfunctions. Special schools are often set up to care for deviant youth; within regular schools, social support services are provided to children and families to ameliorate specific deficiencies in behavior as well as academic functioning.

Foster care is provided for children who cannot remain in their homes because of physical or sexual abuse, neglect, or abandonment by their parents or because they are simply beyond the parents' control. Children in foster homes often suffer from serious disturbances, and sometimes their problems are exacerbated by the placement. Foster parents often participate in special training programs or are directly involved in attending treatment sessions to help them manage and treat the foster children at home.

Many mental health programs are provided by the states. For example, special agencies and youth services monitor families where conditions such as abuse and neglect are suspected. Community programs occasionally provide special services for youth at risk for dysfunction or provide guidance to adults who are trying to manage disturbed youth in community, rather than in a more restrictive treatment setting. In most states, institutions also exist to provide care for those who are so severely impaired that no other facility can treat or even contain them.

Although these various systems are central to the care of some of the most severely affected children with mental disorders, little attention has been given to issues of efficacy of the services they provide. Much research could be done in each of these settings to assess how they can be used to best advantage.

PREVENTIVE INTERVENTIONS FOR POPULATIONS AT RISK

As evidence accumulates that certain children are at risk for specific disorders, it becomes increasingly important to identify these children early and to prevent or ameliorate the effects of the disorder. Evaluation of preventive efforts requires long-term, multifaceted appraisals of outcome.

Advances in early identification of at-risk populations increase the promise that prevention of mental disorder, and reductions in the severity of the effects of mental illness, are possible. As identification of risk factors of mental disorders in both children and adults becomes more refined, a number of intervention strategies may be tested to interrupt the course of development of these disorders. Preventive interventions are likely to be cost effective and relieve individual families and society of great suffering, as well as expense.

Special Populations at Risk

Several populations of children are at particular risk for dysfunction. Researchers have made important advances in identifying these children and detecting clinical problems. Growing evidence suggests that children of adults who have severe disorders are disproportionately at risk for mental health problems of their own. For example, the children of depressed parents have been found to suffer from depression at higher rates than do children of nondepressed parents (Burbach and Borduin, 1986; Morrison, 1983; Weissman, 1988).

Poverty is a major factor for mental disorders in children and adolescents (Comer, 1985). Minority populations are more likely to experience problems of access to care than other groups, and they encounter institutional, cultural, language, and economic barriers (Karno and Edgerton, 1969; Sue, 1977). The concept of mental illness and attitudes toward mental health services differ among minority populations. Special treatments may be needed that not only consider particular mental health problems but intervene in a culturally and ethnically acceptable manner. One effort along these lines is the provision of treatment to Puerto Rican children in the context of culturally relevant folk tales (cuentos) (Costantino, Malgady, and Rogler, 1986). Further research is needed to develop approaches for children in other cultures and to evaluate variations of treatment that might be useful for special populations.

Abused and neglected children have been found to evince such symptoms of dysfunction as depression, inappropriate aggression, slow and deficient cognitive and interpersonal development, dissociative reactions, and poor academic functioning (Rutter and Garmezy, 1983; Wolfe, 1987). Further work is needed to identify these youngsters, who are at extreme risk for long-term clinical dysfunction, and to understand the protective factors that mitigate their risk. Both treatment and preventive efforts are high priorities for research.

Children with physical handicaps and chronic diseases are at high risk for psychiatric dysfunction (Rutter, 1985; Rutter and Garmezy, 1983). As a result of the improved quality of medical treatment, many children with chronic illnesses who would have died in the past are now surviving. Among the formerly fatal chronic diseases that children are now living with--and that have detrimental effects on their mental health--are cancer (Koocher and O'Malley, 1981) and renal failure (Whitt, 1984). Research on interventions designed to aid these children is just beginning.

Several illnesses and environmental stressors have emerged recently that will require new treatment research. For example, understanding and dealing with the mental health consequences of AIDS

is an immense challenge to researchers and care providers alike (see Morin, 1988). The effects of homelessness on children (see Bassuk and Rubin, 1987; Committee on Community Health Services, 1988; IOM, 1988) presents a similar challenge.

Preventive Interventions

The development of safe and effective preventive interventions is essential to reduce the burden of suffering among children in the United States. Interventions that help decrease the rate of onset of dysfunction are referred to as primary prevention. A distinguishing feature of primary prevention is the focus on persons who have not yet developed the condition but are at risk. Preventive interventions can be used throughout the life span to avert or alter the projected course of conditions that are likely to emerge (Price, Cowen, Lorion, and Ramos-McKay, 1988).

General Characteristics

Parental dysfunction, severe depression, alcoholism, hospitalization, and imprisonment are sources of great stress for children, and their effects may be severe for those who are particularly vulnerable. Preventive interventions may be directed at risk factors deemed amenable to treatment in the child, the parents, or entire families. Interventions may encompass special education, tutoring, development of learning skills, a variety of psychosocial treatments, development of social and personal competencies, improvement of parenting skills, or counseling. Different preventive approaches may be needed for specific developmental stages of infants, children, or adolescents at risk.

Prevention programs directed at young children typically include several features: (1) special classes or sessions with the children; (2) contact with the parents and involvement of the family; (3) sensitivity to special needs of the family in regard to education, health care, child-rearing practices, and child development; and (4) protracted and intensive intervention over a period of one or more years. The precise content of these components, and their focus, duration, and means of implementation, can vary widely.

Until now, successful preventive intervention programs have targeted risk factors that in themselves are predictive of high rates of dysfunction and clinical disorder. In this sense, prevention in child mental health resembles prevention in cardiovascular diseases--the goal is "risk reduction" which presumably will have a later impact on overall prevalence of disorders. Nevertheless, research leading to targeted preventive interventions soon should be possible for several specific mental disorders. For example, bipolar disorder (manic-depression), schizophrenia, and alcoholism are

conditions in which some genetic influences have been shown to operate; markers for genetic vulnerability are likely to be discovered in the next few years, and this could offer new preventive opportunities. This will not be quite so straightforward, however, because only a relatively small percentage of children at risk will eventually manifest the condition to which they may be predisposed. It can be expected that a larger proportion will exhibit a variety of other mental disorders, either because of genetic effects or as a result of a stressful psychosocial environment, such as living with disturbed parents (Weissman et al., 1987).

For example, although only 10 percent of the offspring of one schizophrenic parent are at risk for developing schizophrenia, about half of them suffer from various mental disorders (Rieder, Broman, and Rosenthal, 1977). Attentional deficits, disturbances in social behavior, and neuropsychological deficits are common and lifelong in these children (Asarnow and Goldstein, 1986; Goldstein, 1986). Similarly, offspring of depressed mothers often have problems at home and at school during adolescence and are at risk for alcohol, drug abuse, or both (Weissman et al., 1984).

Children with autistic, mentally retarded, or schizophrenic siblings appear to be in need of preventive interventions that might support their development. For example, siblings of autistic children have an increased incidence of cognitive problems and learning disabilities, compared with controls (August, Stewart, and Tsai, 1981; Minton, Campbell, Green, Jennings, and Samit, 1982). One study reported that in 30 percent of families with an autistic child, the siblings felt neglected or "worried," even though there was no significant difference in incidence of diagnosable emotional disturbances between these siblings and normal controls (DeMyer, 1979).

Preventive Intervention Research

The Perry Preschool program, located in Ypsilanti, Michigan, was developed for three- and four-year-olds of low socioeconomic status (Schweinhart and Weikart, 1988). The children were deemed to be at risk because poverty is associated with academic failure and social dysfunction, as well as increased prevalence of clinical disorders. In addition, several studies have shown that academic failure and problems at school are a key link to such later dysfunctions as drug use, teen pregnancy, and unemployment (Bachman, Johnston, and O'Malley, 1978). The Perry program focused on developing child-initiated activities in intellectual, social, and other spheres in a two-year preschool. Teachers visited the children's homes weekly to involve their parents and to assist parents in providing educational experiences for the children. Children with similar risk factors who did not participate in the program served as controls.

Follow-up evaluation at different points many years later showed that those who had been in the program performed better in school, as reflected in better grades and fewer placements in special education classes, had higher levels of literacy, obtained better jobs (by age 19) with higher earnings and greater job satisfaction, relied on public assistance less, and had fewer offenses and contacts with the law. By age 19, the young women who had participated in the program had fewer pregnancies and births. These results suggest that relatively limited early preventive efforts can have broad and long-lasting positive effects.

The above illustration is only one of the effective preventive interventions that have been undertaken (Burchard and Burchard, 1987; Felner, Jason, Moritsugu, and Farber, 1983; Price et al., 1988). The evidence suggests that implementation of interventions in community and educational settings is feasible and that the impact can be significant on clinical, school, and social functioning. Follow-up studies have yet to be completed for many programs; however, intervention in early childhood can affect adolescent and adult functioning in several critical domains, reducing the rate of school drop-out, unemployment, drug use, teen pregnancy, and arrests.

Two recent developments in the mental health disciplines have significant implications for prevention research. First, because disorders can now be more reliably identified and assessed, interventions and their impact can be more accurately evaluated. This will enable investigators to determine the outcome of prevention trials with greater precision. Second, research has greatly improved investigators' ability to identify children who are at risk for developing a disorder. In addition, such early identification can be made for a broader range of disorders.

Prevention research remains inherently difficult and expensive, however. Unlike typical treatment research, prevention studies are often initiated before symptoms are present, so not all children in the target population will develop a dysfunction. In addition, the effects of preventive interventions are likely to appear small and become evident only over an extended period. To evaluate these effects, the subjects must be followed into adolescence and, ideally, adulthood.

Long-term evaluations are especially critical because the magnitude and scope of intervention effects can greatly increase over time (Schorr, 1988). A remarkable example of the "sleeper" effect of delayed, positive impact of preventive interventions was reported recently from the Yale Child Welfare Research Program (Seitz, Rosenbaum, and Apfel, 1985). This was a family support program for socially disadvantaged young mothers and their first babies that lasted through the toddler years (Provence and Naylor, 1983). Mental health principles and professionals were incorporated into every

aspect of this multifaceted program. The impact was not dramatic at first, but when the program's participants were compared with a matched group 10 years after the intervention had stopped, there were very large, positive differences: the participating mothers were much more likely to be off welfare; they had completed more years of schooling; and they had smaller families with more widely spaced children. In addition, their children were half as likely to be having serious problems adjusting to school. The long-term cost/benefit ratio of the program was calculated to be highly favorable.

A recent example of a study using well-designed preventive research methodology was conducted by David Olds and his colleagues (Olds, Henderson, Chamberlin, and Tatelbaum, 1986; Olds and Henderson, 1989). They randomly assigned 400 first-time parents, 85 percent of whom had at least one of a cluster of risk factors (teenaged, unmarried, living in poverty) to four treatment groups. Twenty-three percent of the sample had all three risk factors. The first group was a "no intervention" control which included a screening of the baby at one and two years of age. The second group included the screenings and the provision of free transportation to the prenatal and well-baby medical appointments. The third group built upon that plan by adding to it 9 visits to the home by a nurse during the pregnancy. The fourth group extended the nurse's visits to the baby's second birthday. The nurse's visits were designed to promote linkage with formal service agencies when appropriate and to enhance the social support of the mothers (and fathers when present). Furthermore, the nurses provided parenting and health education and consultation while emphasizing the need for personal planning. Finally, values clarification around social and family issues was included. In this study, group four was clearly receiving a relatively broad and intensive family service. The clearest benefits were reaped by the subjects at greatest risk who received the most extensive treatment. Among the poor, unmarried teenaged mothers, 19 percent of those in the control group abused or neglected their children within the first two years of life. In contrast, the poor, unmarried teenaged mothers in the long-term nurse-visit group maltreated at the rate of 4 percent.

Corroborating evidence for a reduction in scolding rates, provision of more appropriate play materials, and less inappropriate restriction was found for the nurse-visited poor unmarried mothers. Moreover, their children showed a trend toward higher developmental quotients and fewer emergency room visits than their peers in the control group. The findings for the unmarried, poor, teenaged mothers suggest that an intensive and extensive intervention program can prevent child maltreatment and promote good parenting in groups at high risk for parenting dysfunction. Though optimistic, these results also suggest that the program was less effective for the broader cross-sample of mothers at lower risk levels. Further, this program demonstrated that only the intensive and long-term treatment program had important effects.

Preventive efforts alone cannot eradicate mental illness in childhood and adolescence. Even the most effective intervention program will not reduce child abuse, teen pregnancy, drug use, or arrests to zero; yet the reductions have been significant. For example, although child maltreatment was not eliminated in the prevention effort by Olds and colleagues, a substantial gain did result, given the psychopathology associated with abused children (Cicchetti and Carlson, 1989). The committee believes that, despite the difficulties inherent in prevention research, such research is critical if the incidence of dysfunction among children is to be reduced.

NIMH Programs

NIMH funds several preventive mental health intervention research centers focused on studies of preventive interventions with children. NIMH also supports the work of a number of individual investigators studying school- and home-based interventions. One current project is designed to test two different interventions for first- and second-graders, one for overly aggressive children (with and without shyness) and another for children with learning problems (Kellam et al., 1988). Such children are at high risk for later dysfunction. Specially trained teachers offer interventions designed to foster social behavior and to correct problems in the children's mastery of grade-appropriate learning. Children who receive the interventions are being compared with a similar group of children who do not, on a variety of psychological and educational dimensions. Data are being collected longitudinally as students proceed through elementary school in order to assess the cognitive and psychological changes that result. The impact on rates of delinquency, substance abuse, and mental disorders during adolescence will be measured.

In another research program, funded as an NIMH center, psychological interventions are provided to children of divorced parents (Wolchik, Westover, Sandler, and Balls, 1988) children of alcoholic or psychopathological parents (Roosa, Sandler, Beals, and Short, 1988; Roosa, Sandler, Gehring, Beals, and Cappo, 1988) and children who have had a parent die (Sandler, Gersten, Reynolds, Kallgren, and Ramirez, 1988). The research design enables investigators to compare treated and control-group children and requires them to follow the children over several years. Epidemiological data suggest that the children who are the focus of these interventions are at high risk for mental disorder. Short-term data indicate that treating them improves both their academic and their emotional functioning.

METHODOLOGICAL ADVANCES IN TREATMENT RESEARCH

Several substantial additions have been made recently to the armamentarium of intervention research. Some are mentioned in later sections of this chapter, where appropriate, but others are of sufficient general importance to merit description here.

Reliable and Valid Measures

Systematic, reliable measures for diagnosing and monitoring mental disorders must be available before treatment interventions can be evaluated. The range and quality of available measures have increased markedly over the last several years, including those for depression, anxiety, learning disability, attention-deficit disorder, brain injury, and eating disorders (Mash and Terdal, 1988; Rutter, Tuma and Lann, 1988). Techniques now exist to quantify the quality and amount of social support children receive, the quality of their families' functioning, the nature of their attachment to their parents, and nature of their parents' marital relationship. Much progress has been made in the precise assessment of multiple aspects of the child's cognitive development, self-concept, positive affective experiences, and habitual ways of coping with stressful events.

Investigators have also begun to assess the presence of side effects, the difficulty and cost of implementing treatment, the acceptability of treatment to children and their families, compliance with the treatment regimen, and other factors essential to evaluation of treatment. The recent emergence of methods to measure the impact of treatment (and other features of patient reactions to and compliance with treatment) will enable investigators to compare various aspects of alternative interventions.

Further research is needed to refine measures of treatment effects so that they will be useful across subpopulations and settings. Such research is heavily dependent on the ability to study normal as well as abnormal populations and on multiple testing of subjects. Treatment evaluation requires assessment of appropriate and inappropriate social behavior and a quantifiable evaluation of functioning in different situations. Measures developed for other purposes, such as the epidemiological tools for identifying cases described in Chapter 2, are not necessarily suitable for treatment evaluation.

To improve understanding of child functioning and to evaluate specific kinds of treatment, further assessment research is needed. One area in which further work is essential is the evaluation of family functioning. Children are enmeshed in complex patterns of family interaction that often contribute directly to their problems. Children of parents with depression or antisocial behavior disorder,

for example, are at risk for developing similar problems. With these as well as other clinical problems, researchers can identify parent-child patterns of interaction that are likely to promote clinical dysfunction in the child (Patterson, 1982). Further work is needed to identify different types of families and critical dimensions along which families can be evaluated. Measures are needed to see whether changes in critical parent-child interactions are being brought about by treatment. In general, the assessment of family functioning is pivotal to the understanding of normal family processes and how these processes relate to child adaptation in and outside the home.

Advances in Statistical Techniques

Advances in statistical techniques have expanded the range of questions that can be asked and the complexity of analyses that can be carried out, enabling researchers to test hypotheses about factors which may mediate changes observed as a result of treatment. For example, statistical elaboration of the interaction among the causes of an observed treatment effect is now commonplace in children's mental health research. Models of the processes through which treatments operate, as well as the factors leading to clinical dysfunctions, can be more readily tested with new methods of data analysis (Newcomb and Bentler, 1988; Patterson, 1986). Statistical methods recently developed and in extensive use by economists have enabled scholars to formalize the nature of therapeutic processes occurring over time and are likely to contribute significantly to the identification of particularly effective components of treatments (Moran and Fonagy, 1987). Taken together, they allow empirical study of many of the important dynamically interactive processes that take place over the course of development, as well as during treatment. Careful and intensive application of these techniques will contribute to the provision of better structured, more rational and effective treatments for children and adolescents.

The development of meta-analysis in treatment evaluation has led to novel evaluations of large bodies of research (Kazdin, 1988; Smith, Glass, and Miller, 1980). Such analyses can examine questions from large sets of studies, including many questions that cannot be addressed by individual studies. From meta-analyses researchers have identified consistencies in treatments among studies, the kinds of patients who are likely to change, and the kinds of persons who are most likely to be effective in administering treatment (for example, Weisz, Weiss, Alicke, and Klotz, 1987).

Clinical Trials

The term "clinical trials" refers to a class of studies designed to assess the therapeutic effects of a procedure or technique when

applied to a specified set of patients, problems, and disorders. The method is sometimes more useful in demonstrating that a treatment works than in determining how it works. Nevertheless, clinical trials research can, depending on its level of sophistication, provide important information regarding the process of therapy, that is, the unique roles of different treatment techniques and their hypothesized mechanisms of change.

The gold standard of intervention research is the randomized clinical trial, which usually requires that the following design conditions be met: (1) each subject has an equal chance of being assigned to each treatment condition; (2) the chosen intervention is presented in the same way to all subjects within a group; (3) adequate controls are used to ensure that changes result from the intervention, rather than from unrelated factors or the mere passage of time; (4) the research protocol is sufficiently detailed to enable others to replicate the study; and (5) subjects are reliably tested on specified dimensions before, during, at the end, and at predetermined times after treatment.

Although the randomized clinical trial is expensive, no alternative means of evaluating interventions provides comparably valid information (see Chalmers, 1981; Wortman and Saxe, 1982). Currently, there is a paucity of randomized clinical trials of treatments for children and adolescents with mental disorders (Kazdin, 1988; Saxe, Cross, and Silverman, 1987). Reviewers have identified less than 150 treatment studies involving controls (Casey and Berman, 1985; Weisz, Weiss, Wasserman, and Rintoul, 1987). Many of these are studies of experimental treatment approaches; clinical trial data are available only for a very few of the treatments most commonly used with children and adolescents in clinical practice.

Reproducible Treatments

A better understanding of mental dysfunction in children has enabled researchers to pinpoint the components of treatment likely to bring about therapeutic change. To this end, specific treatment techniques have been set forth in manuals for therapists. The provision of such concrete guidelines makes it feasible to assess the extent to which those delivering treatment actually adhere to the specifications of the technique and to develop collaborative research efforts at multiple centers. The importance of "treatment integrity" has been recognized only recently. Progress in this area has ensured that the results of future studies will give a clearer estimate of the effectiveness of specific treatments and the extent to which the conclusions may be extended to other patient groups.

PROMISING STRATEGIES FOR TREATMENT RESEARCH

The development and identification of safe and effective prevention and treatment interventions for children and adolescents requires diverse types of research. Outcome studies are needed to evaluate promising interventions systematically. Table 4-3 summarizes several treatment evaluation strategies, the treatment questions that are asked, and the basic requirements for making comparisons among treatments. Each strategy listed in the table refers to a type of investigation, rather than to a single study. In practice, multiple studies are needed to answer a single question, to ensure that the findings can be replicated.

Treatment research that evaluates interventions progressively is essential for further progress. This type of research accumulates information slowly, but it will result in safe, effective interventions. The benefits of a programmatic approach are already evident in the evaluation of some techniques.

Test a Broad Range of Treatments

There has been a widespread tendency to study therapeutic techniques and procedures which are relatively short-term and readily brought under strict experimental control. For example, several studies have evaluated treatments derived from cognitive therapy and behavior therapy, yet there is a dearth of studies of the efficacy of many other treatments more commonly employed by psychiatrists, psychologists, and social workers in private practice settings or in clinically oriented institutions (American Academy of Child Psychiatry, 1983). There is a pressing need to broaden the range of methods submitted to empirical scrutiny. Reliable information about the everyday practice of clinicians must be gathered, if funds expended on treatment research are to yield maximal returns.

Fortunately, progress in research methods, already mentioned, has brought about the possibility of bringing empirical methods to bear upon a large range of interventions used in clinical practice. Psychodynamically oriented treatments, despite their widespread use, have not thus far been subjected to extensive systematic investigations. As an exception, a recent investigation has shown that psychoanalytic treatment improved adaptation, self-esteem, and the capacity for interpersonal relationships among children referred for learning disturbances and academic deficiencies (Heinicke and Ramsey-Klee, 1986).

Other work has shown that treating disturbances of psychosexual development and/or interpersonal relations by psychoanalytic therapy can help diabetic children engage in behaviors that control their previously uncontrolled diabetes (Moran and Fonagy, 1987). Similarly,

TABLE 4-3: Alternative Treatment Evaluation Strategies to Develop an Effective Intervention

Treatment Strategy	Question Asked	Basic Requirements
Treatment Package	Does treatment produce therapeutic change?	Treatment vs. no treatment or waiting-list control
Parametric Strategy	What changes can be made in the specific treatment to increase its effectiveness?	Two or more treatment groups that differ in one or more facets of the treatment
Dismantling Strategy	What components are necessary, sufficient, and facilitative of therapeutic change?	Two or more treatment groups that vary in the components of treatment that are provided
Comparative Outcome Strategy	Which treatment is the more or most effective for a particular problem?	Two or more different treatments for a given clinical problem
Process-Outcome Strategy	What processes occur in treatment that enhance, contribute to, or are responsible for treatment outcome?	Treatment groups in which patient and therapist interactions are evaluated within the sessions
Patient-Therapist Variation Strategy	Which characteristics of the child, family, therapist, or setting are necessary to make the treatment effective?	Treatment as applied separately to different types of children, therapists, and so on

Adapted from: Kazdin (1988).

family therapies which are widely employed in clinical practice for children and adolescents have received increased attention in research. Although a paucity of controlled studies remains, a recent review of several evaluations of family therapies showed improved child and adolescent dysfunction (Hazelrigg, Cooper, and Borduin, 1987). Investigations of psychodynamic treatments and family therapies as illustrated here are not only important in their own right but also set the stage for examining other approaches used in clinical settings.

Investigate Combined Treatments

It is important to determine whether the efficacy of the best single treatment known can be enhanced by combining it with another therapeutic approach. It has been suggested that a combination of pharmacotherapy and behavior therapy may often be more effective than either of these treatments alone (Sprague and Werry, 1971). Although many clinicians would be inclined to use multiple interventions, there is at present almost no research to guide them in identifying potentially effective combinations. With an increasing emphasis on a multidisciplinary team approach to the care of children and adolescents, and an increased number of eclectic clinicians, the feasibility of combining treatments has increased. A comprehensive treatment approach may need particularly careful investigation where drug and psychosocial treatments and special education are used in combination for the same child.

At present, there is considerable information on three treatments for disorders of children: pharmacotherapy, behavior therapy, and cognitive therapy. These treatments lend themselves to study in a number of conditions. In children with attention-deficit disorder, for example, comparisons of methylphenidate therapy, behavior modification, and the combination of the two treatments have yielded mixed results (see review by Gittelman-Klein, 1987).

Although it is believed (or has been speculated) that medication makes children more amenable to psychosocial treatment, it is not known in general whether psychological and pharmacological treatments are additive in their effects, whether there are circumstances in which medication increases or decreases children's accessibility to psychological intervention, or whether a particular sequence of the two forms of treatment is more desirable. Nor is it known whether certain drug and psychological treatment combinations are more useful than others, whether specific symptoms identify particular children as potential drug responders, and whether psychosocial events exist which have the potential to disrupt the drug treatment of children. These critical questions need to be answered by future research.

Most important in the case of each major childhood and adolescent mental disorder is the identification of those symptoms which respond well and those which fail to respond to particular treatments. Studies may then be initiated to assess what combinations of treatments may overcome the shortcomings of each treatment on its own. Carefully controlled studies of combined treatments will provide an additional point of departure for attempts to identify ways of maximizing the efficacy of current methods of treatment.

Assess Long-Term Effects

Many of the gains demonstrated by treatment for children and adolescents have been tested within a relatively brief time frame. For example, in the largest survey of treatment-control comparisons with children and adolescents (Weisz, Weiss, Wasserman, and Rintoul, 1987), many of the identified studies included no assessment of treatment effects after the immediate posttreatment assessment. For those studies that did conduct follow-up assessments, the average wait after the end of treatment was less than six months. Follow-up studies of the long-term effects of treatment are especially important, because long-term effects may not be the same as effects evident immediately after treatment (Kazdin, 1988; Wright, Moelis, and Pollack, 1976). Indeed, some treatments that appear to be effective in the short run do not show sustained effects; other treatments produce little or no immediate effect but result in significant improvements one to two years later (Heinicke and Ramsey-Klee, 1986; Kolvin et al., 1981). These conclusions are equally important in evaluations of preventive interventions.

RESEARCH ON SERVICE DELIVERY AND SYSTEMS OF CARE

Any complete treatment research program must consider not only specific treatment approaches but also the contexts in which they occur. One element of such systems research is services research. It includes studies of how treatment is actually delivered; issues of costs, both the direct costs of treatment and support and the indirect costs of the burdens illness impose, and possible uses of data collected in clinical settings and across multiple research programs.

Services Research

Children with severe mental disorders are usually involved in multiple services and settings. Comprehensive systems of service include diagnosis and treatment, as well as care ranging from provision of health and dental coverage to social services for the family (see Stroul and Friedman, 1986). Research is needed on the impact of clinical services as typically provided. Although such

investigations will often be methodologically limited, they will permit evaluation of the impact of services delivery on child, adolescent, and family functioning.

Many critical services provided for children, adolescents, and their families have not been carefully evaluated. For example, severely impaired children are often given acute as well as long-term care in hospitals. Little research exists on the effect of hospital care and whether less costly alternatives, when feasible, are equally or even more beneficial (Schaefer and Swanson, 1988). Programs that have reduced reliance on inpatient facilities need to be examined from the perspective of their long-term consequences. For example, the use of nonhospital residential treatment centers has increased enormously (Stroul and Friedman, 1986) with little research on the role played by these centers. Few carefully controlled studies exist of less restrictive home-based treatments such as therapeutic foster care or residential treatment centers (Auclaire and Schwartz, 1987). Similarly, the appropriate use of "family preservation services" requires additional study. At the same time, evaluation efforts are required to safeguard children who need intensive treatment from the misapplication of rules and regulations that make early intervention and use of proven treatment strategies burdensome for them, the provider, and the families or consumers.

Many innovative services and demonstration efforts go unevaluated, at least with respect to their effects on the individuals or groups they are intended to help. For example, federal demonstration programs such as the NIMH-sponsored Child and Adolescent Service System Program (CASSP) and programs for the homeless mentally ill often lack an evaluative component (Stroul and Friedman, 1986). In general, services provided to children fall within the purview of a great many organizations and agencies. Agencies with the greatest expertise in the delivery of services may lack expertise to conduct systematic evaluations of the outcomes of these services. Foundations may fund model programs without providing for systematic evaluation of these programs. NIMH has an important role in facilitating the evaluation of these ongoing programs and disseminating knowledge gained through them. It can directly fund outcome evaluation in federal demonstration programs aimed at providing services for children and youth. Beyond demonstration projects, evaluations of services at the local level and across multiple sites should be encouraged through new funding initiatives.

The goal is to ensure that service systems have the requisite resources both to provide and to evaluate services. The resources can be obtained through collaboration between service delivery systems and academic institutions. Such collaboration can evaluate the impact of services and identify the persons for whom such services are most effective. Evaluation must be an integral component of demonstration and service projects from the beginning. This means that evaluation

should be considered when requests for proposals are being developed, and applicants for funding should be given specific instructions concerning the evaluation of components of the demonstration projects. No service or demonstration project in the area of child mental health should receive federal funds unless it has sound procedures in place for evaluating its beneficial effects on the children it is designed to serve.

Evaluation Research

A great need exists for information on the extent to which research findings can be extended to clinical settings. This is a particularly appropriate time to gather such information, given the growth in basic and intervention research and the improved methodology for evaluation research (Saxe and Fine, 1981; Bickman, 1985). Such research should involve efforts to implement in clinical settings procedures that have proved effective in experimental studies. Implementation-extension studies, if properly executed, would almost certainly include extensive staff training, monitoring of therapy sessions, and pretreatment, posttreatment, and follow-up assessments of client adjustment using multiple outcome measures. Properly conducted evaluative research is likely to be labor-intensive and expensive, and perhaps certain areas will need to be identified as high priority. In high-priority areas, comprehensive evaluations should be attempted; in other areas, monitoring and rudimentary information collection and analysis may be more appropriate.

Integration of Existing Research Findings

Historically, funds have been available for individual studies on the efficacy of a particular treatment for a particular problem but not for efforts to integrate the findings of multiple studies. Both individual studies and integrated findings are essential to the development of knowledge in the field. Integrated findings can help identify the kinds of therapies that have proved most successful with various mental health problems, the problems that have proved most resistant to treatment, the replicated findings that warrant large-scale intervention projects, and the gaps in knowledge toward which future research should be directed.

Such integrative efforts are particularly needed in the area of child and adolescent psychotherapy outcomes. Studies in this area tend to be published in a much broader array of journals than most researchers can reasonably monitor--journals in such diverse fields as psychiatry, psychology, social work, nursing, pediatrics, education, rehabilitation, and even dentistry (for example, studies of treatment for dental phobia). Thus, it is unusually difficult for researchers in this area to keep abreast of current knowledge.

RESEARCH RECOMMENDATIONS

Use Existing Data

Existing information about the effects of treatment can be used more efficiently. In fact, efforts to record, organize, and integrate extant information may strengthen the link between research and ongoing clinical activity; promote shared resources among widely scattered researchers; and clarify the overall state of knowledge in the field.

Data from Clinical Settings

Outpatient clinics and inpatient hospital units are the front line of mental health care. Information on patient characteristics, the treatments they receive, and their adjustment before and after treatment would be very useful. Such data are readily available, and analysis of it could reveal the kinds of individuals who seek treatment, the problems for which treatment is sought, the kinds of interventions typically employed for various problems, and the changes experienced by patients who receive the various treatments. Descriptive data on patients referred to these treatment settings could help identify appropriate targets for preventive efforts. The relationships found among kinds of patients, kinds of interventions, and outcomes should also be helpful to investigators who study treatment effects in controlled clinical trials.

Recently expanded requirements for recordings, coupled with the ease of access to such information via computers, make the development of outpatient and inpatient databases increasingly possible. Establishing a sound database, even when building on information already available, requires programming and analytic personnel. There is currently no outside source of funding for database development. As a result, many treatment facilities throughout the United States collect little or no research data on their patients, the treatments provided, or changes in patients over the course of treatment. NIMH should foster the development of database systems for use in clinical services. The initial focus should be on demonstration projects, where database, service delivery, and evaluation can be tried on a small scale.

Increase Support for Direct Tests of Treatment

To develop effective interventions that address the full range of mental disorders of children and adolescents, several types of treatment research are needed.

Small-Scale Outcome Studies

Investigations are needed to evaluate individual techniques and basic outcome questions related to efficacy and safety. Clinical trials of interventions conducted with well specified patient populations are the backbone of needed research to develop effective treatments. Existing research indicates that a number of psychotherapeutic and psychopharmacological techniques are effective. The number of outcome studies devoted to evaluating individual treatments should be greatly increased.

Clinical Drug Trials

Clinical drug trials, particularly those involving inpatients, are very time-consuming and costly and require highly specialized manpower and settings; consequently, few investigators conduct them. Yet research in such controlled settings is necessary, because compliance can be ensured and efficacy and safety can be closely monitored. High priority should be given to clinical studies of the efficacy and safety of drugs; effects of drugs on learning, performance, and IQ; comparison of drug, psychosocial, and combined treatments; and comparison of drug therapy, therapy involving the parents as co-therapists, and combined therapies.

Matching Treatment to Clinical Problems

Research on which kind of children with a given disorder will respond to which kinds of treatment is needed to improve outcomes. For example, among depressed children, which kinds of patients will be helped by pharmacotherapy and which by psychotherapy? Which patients will be helped by a combination of pharmacotherapy and psychosocial treatments or a combination of psychosocial treatments? At what stage of their illness? Studies matching treatments to clinical problem are essential to improving outcomes and should be funded.

Evaluation of Combined Treatments

Combined treatments warrant research attention for several reasons: many children have multiple disorders (comorbidity); many disorders adversely affect functioning in several areas; and residual problems often remain after treatment of a specific disorder. At present, three classes of treatment appear to lend themselves to combination and evaluation: pharmacotherapy, behavior therapy, and cognitive therapy. All three are relatively well specified, focus on different facets of functioning and hence are likely to be complementary in their effects, and include procedures that can be applied to diverse disorders. Combinations of pharmacotherapy,

behavior therapy, and cognitive therapy should be made high priorities for research.

Studies of Treatments Used in Clinical Practice

Many treatments judged to be effective in clinical practice have not received sufficient empirical attention. Individual psychotherapy, family therapy, psychodynamically based treatment, and relationship therapy are primary examples. Funding of research on inadequately tested treatments used in clinical practice should be given high priority.

Extension of Effective Techniques to Practice

Several behavior therapy and cognitive therapy techniques have shown promise in carefully evaluated research settings but have yet to be extensively evaluated in clinical practice. Treatments that have proved successful in research should be tested for effectiveness in clinical practice.

Increase Long-Term Support for Treatment Development and Evaluation

Individual studies alone will not lead to the development of effective interventions. Recruitment, treatment, and follow-up of patients one to two years after treatment are essential in any investigation designed to evaluate the impact of treatment. Such information cannot be obtained quickly because it takes time for the effects of treatment to appear. Moreover, the effects at one year after treatment may be different from those evident immediately after treatment. The development of effective treatments requires a series of studies using various research strategies. There are at present no mechanisms to support the programmatic research needed.

Long-Term Funding of Investigators

Funding for investigators carrying out long-term studies of treatment should be increased. The prospect of continued funding may encourage investigators to work on the treatment of child mental health problems. ADAMHA supports a variety of programs designed to promote career development and career stability among outstanding research scientists. The Scientist Development Award and the Scientist Development Award for Clinicians are the most recent examples of such programs (see Chapter 5 Appendix). The committee would like to see an expansion of such programs.

Centers of Research Devoted to Treatment Evaluation

Centers should be funded, perhaps through Program Project and Clinical Research Center grants, for ongoing treatment research. Such centers would provide stable funding for a cadre of investigators. The need for stable, long-term funding cannot be overemphasized, given the social and economic importance of the task of identifying, developing, and evaluating effective treatments.

Multisite Collaborative Studies

Larger-scale studies of treatments, in which several investigators at different sites undertake simultaneous evaluations, should be funded. Such studies provide critical information about the reliability and reproducibility of treatment effects.

Support Prevention Research

Prevention research needs to be conducted on children in high-risk groups who can be identified early. High priority should be given to efforts to prevent clinical dysfunction among children who have been subjected to abuse (physical or sexual) and neglect, children of parents with psychopathology (including substance abuse, antisocial behavior, and depression), and children at a severe social disadvantage.

NIMH should foster careful evaluations of early intervention projects. It is often the case that those who are effective in conceiving and carrying out innovative projects are not those equipped to evaluate them. Such groups require assistance from professionals with the requisite talents in the design and execution of evaluation studies, which will help justify extension of these efforts. Therefore, NIMH should consider convening program directors from the the most promising community-based intervention programs across the country to meet with epidemiologists and skilled evaluators to jointly consider how best to incorporate assessment procedures into existing programs and into those now in the planning stages.

Increase Funding for Studies of Disorders and Dysfunction

Improvements in treatment are likely to emerge as further progress is made in understanding clinical disorders. Several lines of work are needed to clarify the nature of clinical dysfunction.

Longitudinal Studies

Prospective longitudinal studies of children should be funded, in order to follow the course of dysfunction over time. Basic questions for research are the long-term course of childhood disorders and the possible comorbidity of disorders. It is essential to determine what symptoms may wax and wane over time, what factors early in development predict continued dysfunction, and what factors may protect the child from or lessen dysfunction. Such research will have a powerful impact on the development of interventions.

Evaluation of the Family in Relation to Child Dysfunction

Support should be provided to study the impact on children of the contexts in which they function and the relation of these contexts to clinical disorders; specifically, additional research is needed on the impact of the family and the family's role in the emergence of dysfunction. The family is acknowledged to be a basic ingredient in many problems and solutions of child mental health. Further understanding of it will permit identification of families that place children at risk for dysfunction and factors that protect vulnerable children from the onset of the dysfunction. The impact of parent functioning, marital interactions, parent-child interactions, and alternative models of child-rearing on child adjustment and disorders needs to be carefully examined. In addition, the changing family structure requires evaluation of alternative family systems, foster care, short-term transitional families, and other variations that have emerged. Results of these studies will have a powerful impact on the development of approaches to prevention and treatment.

Support Systems and Services Research

Children and adolescents with mental disorders receive care in a variety of settings. Although these settings often do not permit experimental investigation of treatment, they do provide unique and important opportunities for evaluation. Quasi-experimental research designs can be devised to take into account the special limits of service delivery programs and can be used to reach conclusions about their impact. Thus, the information obtained from many service delivery systems can contribute directly to the identification of effective interventions.

Coordinated efforts are needed to acquire the necessary information and to begin to assess issues related to the costs of childhood mental disorders and of their treatments. Only a federal initiative can assure that appropriate kinds of data are collected. NIMH should fund an evaluation of ongoing mental health programs from which conclusions might be drawn about the impact of treatment.

References

Abikoff, H., & Gittelman, R. (1985). Hyperactive children treated with stimulants: Is cognitive training a useful adjunct? Archives of General Psychiatry, 42, 953-961.

American Academy of Child Psychiatry. (1983). Child psychiatry: A plan for the coming decades. Washington, DC: Author.

American Psychiatric Association. (1980). Diagnostic and statistical manual of mental disorders (3rd ed.) Washington, DC: Author.

American Psychiatric Association. (1987). Diagnostic and statistical manual of mental disorders (3rd ed., rev.). Washington, DC: Author.

Anderson, L. T., Campbell, M., Adams, P., Small, A. M., Perry, R., & Shell, J. (1989). The effects of haloperidol on discrimination learning and behavioral symptoms in autistic children. Journal of Autism and Developmental Disorders, 19(2), 227-239.

Anderson, L. T., Campbell, M., Grega, D. M., Perry, R., Small, A. M., & Green, W. H. (1984). Haloperidol in the treatment of infantile autism: Effects on learning and behavioral symptoms. American Journal of Psychiatry, 141, 1195-1202.

Arnold, J., Levine, A., & Patterson, G. R. (1975). Changes in sibling behavior following family intervention. Journal of Consulting and Clinical Psychology, 43, 683-688.

Asarnow, J. R., & Goldstein, M. J. (1986). Schizophrenia during adolescence and early adulthood: A developmental perspective on risk research. Clinical Psychology Review, 6(3), 211-235.

Auclaire, P., & Schwartz, I. M. (1987). Are home-based services effective: A public child welfare agency's experiment. Children Today, 16, 6-9.

August, G. J., Stewart, M. A., & Tsai, L. (1981). The incidence of cognitive disabilities in the siblings of autistic children. British Journal of Psychiatry, 138, 416-422.

Bachman, J. G., Johnston, L. D., & O'Malley, P. M. (1978). Delinquent behavior linked to educational attainment and post-high school experiences. In L. Otten (Ed.), Colloquium on the correlates of crime and the determinants of criminal behavior (pp. 1-43). Arlington, VA: The Mitre Corporation.

Barkley, R. A. (1981). Hyperactive Children: A handbook for diagnosis and treatment. New York: Guilford Press.

Bassuk, E. L., & Rubin, L. (1987). Homeless children: A neglected population. American Journal of Orthopsychiatry, 5(2), 1-9.

Bernstein, G. A., Hughes, J. R., Mitchell, J. E., & Thompson, T. (1987). Effects of narcotic antagonists on self-injurious behavior. Journal of the American Academy of Child and Adolescent Psychiatry, 26, 886-889.

Bickman, L. (1985). Improving established statewide programs: A component theory of evaluation. Evaluation Review, 9, 189-208.

Bornstein, P. H., & Kazdin, A. E. (Eds.). (1985). Handbook of clinical behavior therapy with children. Homewood, IL: Dorsey.

Burbach, D., & Borduin, C. (1986). Parent-child relations and the etiology of depression: A review of methods and findings. Clinical Psychology Review, 6, 133-153.

Burchard, J. D., & Burchard, S. N. (1987). Prevention of delinquent behavior. Newbury Park, CA: Sage.

Campbell, M., Adams, P., Perry, R., Spencer, I. D., & Overall, J. E. (1988). Tardive and withdrawal dyskinesia in autistic children: A prospective study. Psychopharmacology Bulletin, 29, 251-155.

Campbell, M., Green, W. H., & Deutsch, S. I. (1985). Child and adolescent psychopharmacology. Beverly Hills, CA: Sage Publications.

Campbell, M., Anderson, L. T., Meier, M., Cohen, I. L., Small, A. M., Samit, C., & Sachar, E. J. (1978). A comparison of haloperidol, behavior therapy and their interaction in autistic children. Journal of the American Academy of Child Psychiatry, 17, 640-655.

Campbell, M., Overall, J. E., Small, A. M., Sokol, M. S., Spencer, E. K., Adam, P., Foltz, R. L., Monti, K. M., Perry, R., Nobler, M., & Roberts, E. (1989). Naltrexone in autistic children: An acute open-dose range tolerance trial. Journal of the American Academy of Child and Adolescent Psychiatry, 28, 200-206.

Campbell, M., Small, A. M., Green, W. H., Jennings, S. J., Perry, R., Bennett, W. G., & Anderson, L. (1984). Behavioral efficacy of haloperidol and lithium carbonate: A comparison in hospitalized aggressive children with conduct disorder. Archives of General Psychiatry, 41, 650-656.

Campbell, M., & Spencer, I. K. (1988). Psychopharmacology in child and adolescent psychiatry: A review of the last five years.

Journal of the American Academy of Child and Adolescent Psychiatry, 27, 269-279.

Casey, R. J., & Berman, J. S. (1985). The outcome of psychotherapy with children. Psychological Bulletin, 98, 388-400.

Chalmers, T. C. (1981). The clinical trial. Milbank Memorial Fund Quarterly, 59, 324.

Cicchetti, D., & Carlson, V. (Eds.). (1989). Child maltreatment: Theory and research on the causes and consequences of child abuse and neglect. Cambridge: University press.

Cohen, I. L., Campbell, M., Posner, D., Small, A. M., Triebel, D., & Anderson, L. T. (1980). Behavioral effects of heloperidol in young autistic children: An objective analysis using a within-subjects reversal design. Journal of the American Academy of Child Psychiatry, 19, 665-677.

Comer, J. P. (1985). The Yale-New Haven primary prevention project: A follow-up study. Journal of the American Academy of Child Psychiatry, 24(2), 154-160.

Committee on Community Health Services. (1988). Health needs of homeless children. Pediatrics, 82(6), 938-940.

Costantino, G., Malgady, R. G., & Rogler, L. H. (1986). Cuento therapy: A culturally sensitive modality for Puerto Rican children. Journal of Consulting and Clinical Psychology, 54, 639-645.

DeMyer, M. K. (1979). Parents and children in autism. New York: John Wiley & Sons.

Dostal, T. (1972). Antiaggressive effect of lithium salts in mentally retarded adolescents. In A. L. Annell (Ed.), Depressive states in childhood and adolescence (pp. 491-498). Stockholm: Almquist & Wiksell.

Douglas, V. I., Barr, R. G., O'Neill, M. E., & Britton, B. G. (1986). Short term effects of methylphenidate on the cognitive, learning and academic performance of children with attention deficit disorder in the laboratory and the classroom. Journal of Child Psychology and Psychiatry, 27, 191-211.

Evans, R. W., Clay, T. H., & Gualtieri, C. T. (1987). Review article: Carbamazepine in pediatric psychiatry. Journal of the American Academy of Child and Adolescent Psychiatry, 26(1), 2-8.

Feighner, J. P., Robins, E., Guze, S. B., Woodruff, R. A., Winokur, G., & Munoz, R. (1972). Diagnostic criteria for use in

psychiatric research. Archives of General Psychiatry, 26, 57-63.

Feldman, R. A., Caplinger, T. E., & Wodarski, J. S. (1983). The St. Louis conundrum: The effective treatment of antisocial youths. Englewood Cliffs, NJ: Prentice-Hall.

Felner, R. D., Jason, L. A., Moritsugu, J. N., & Farber, S. S. (Eds.). (1983). Preventive psychology: Theory, research and practice. New York: Pergamon.

Firestone, P., Kelly, M. J., Goodman, J. T., & Davey, J. (1981). Differential effects of parent training and stimulant medication with hyperactives: A progress report. Journal of the American Academy of Child Psychiatry, 29(1), 135-147.

Gittelman-Klein, R. (1987). Pharmacotherapy of childhood hyperactivity: An update. In H. Y. Meltzer (Ed.), Psychopharmacology: The third generation of progress (pp. 1215-1224). New York: Raven Press.

Goldstein, M. J. (1986). Prevention of schizophrenia: What do we know. In: The Prevention of Mental-Emotional Disabilities. Resource papers in the Report to the National Mental Health Association Commission on the Prevention of Mental-Emotional Disabilities, (pp. 223-239). Arlington, Virginia.

Gualtieri, C.T., Schroeder, S. R., Hicks, R. E., & Quade, D. (1986). Tardive dyskinesia in young mentally retarded individuals. Archives of General Psychiatry, 43, 335-340.

Hazelrigg, M. D., Cooper, H. M., & Bordiun, C. M. (1987). Evaluating the effectiveness of family therapies: An integrative review and analysis. Psychological Bulletin, 101, 428-442.

Heinicke, C. M. & Goldman, A. (1960). Research on psychotherapy with children: A review and suggestions for further study. American Journal of Orthopsychiatry, 30, 483-494.

Heinicke, C. M. & Ramsey-Klee, D. M. (1986). Outcome of child psychotherapy as a function of frequency of session. Journal of the American Academy of Child Psychiatry, 25, 247-253.

Herman, B. H., Hammock, M. K., Arthur-Smith, A., Egan, J., Chatoor, I., Werner, A., & Zelnik, N. (1987). Naltrexone decreases self-injurious behavior. Annals of Neurology, 22(4), 550-552.

Hoghughi, M., Lyons, J., Muckley, A., & Swainston, M. (1988). Treating problem children: Issues, methods, and practice. London: Sage Publications.

Hood-Williams, J. (1960). The results of psychotherapy with children:

A reevaluation. Journal of Consulting Psychology, 24, 84-88.

Institute of Medicine. (1988). Homelessness, health, and human needs. Washington, DC: National Academy Press.

Johnson, J. H., Rasbury, W. C., & Siegel, L. J. (1986). Approaches to child treatment: Introduction to theory, research, and practice. Newbury Park, CA: Sage Publications.

Karno, M. & Edgerton, R. M. (1969). Perception of mental illness in a Mexican-American community. Archives of General Psychiatry, 20, 233-238.

Kazdin, A. E. (1985). Treatment of antisocial behavior in children and adolescent. Homewood, IL: Dorsey Press.

Kazdin, A. E. (1988). Child psychotherapy: Developing and identifying effective treatments. New York: Pergamon.

Kellam, S., Anthony, J., Brown, C. H., Dolan, L., Werthamer-Larsson, L., Buckner, J., & Carran, D. (1988). Periodic outcome of two preventive trials (grant proposal submitted to the National Institute of Mental Health, Rockville, Maryland), Johns Hopkins University, Baltimore, Maryland.

Kolvin, I., Garside, R. F., Nicol, A. E., MacMillan, A., Wolstenholme, F., & Leitch, I. M. (1981). Help starts here: The maladjusted child in the ordinary school. London: Tavistock.

Koocher, G. P., & O'Malley, J. E. (1981). The Damocles syndrome. New York: McGraw Hill.

Levitt, E. E. (1957). The results of psychotherapy with children: An evaluation. Journal of Consulting Psychology, 21, 189-196.

Levitt, E. E. (1963). Psychotherapy with children: A further evaluation. Behaviour Research and Therapy, 60, 326-329.

Mash, E. J. & Terdal, L. G. (Eds.). (1988). Behavioral assessment of childhood disorders (2nd ed.). New York: Guilford Press.

Minton, J., Campbell, M., Green, W. H., Jennings, S., & Samit, C. (1982). Cognitive assessment of siblings of autistic children. Journal of the American Academy of Child Psychiatry, 21, 256-261.

Moran, G. S., & Fonagy, P. (1987, June). Insight and symptomatic improvement. Paper presented at the Workshop on Psychotherapy Outcome Research with Children, National Institute of Mental Health, Bethesda, Maryland.

Morin, S. F. (1988). AIDS: The challenge to psychology. American

Psychologist, 43, 838-842.

Morris, R. J. & Kratochwill, T. R. (Eds.). (1983). The practice of child therapy. New York: Pergamon.

Morrison, H. L. (Ed.). (1983). Children of depressed parents: Risk, identification, and intervention. New York: Grune & Stratton.

Newcomb, M. D. & Bentler, P. M. (1988). Consequences of adolescent drug use. Newbury Park, CA: Sage Publications.

Olds, D. L., & Henderson, C. (1989). The prevention of maltreatment. In D. Cicchetti & V. Carlson (Eds.), Child maltreatment: Theory and research on the causes and consequences of child abuse and neglect (pp. 722-763). New York: Cambridge University press.

Olds, D., Henderson, C., Chamberlin, R., & Tatelbaum, R. (1986). Preventing child abuse and neglect: A randomized trial of nurse home visitation. Pediatrics, 78, 65-78.

Patterson, G. R. (1982). Coercive family process. Eugene, OR: Castalia.

Patterson, G. R. (1986). Performance models for antisocial boys. American Psychologist, 41, 432-444.

Patterson, G. R., Chamberlain, P., and Reid, J. B. (1982). A comparative evaluation of a parent-training program. Behavior Therapy, 13, 638-650.

Perry, R., Campbell, M., Adams, P., Lynch, N., Spencer, E. K., Curren, E. L., & Overall, J. E. (1989). Long-term efficacy of haloperidol in autistic children: Continuous vs. discontinuous drug administration. Journal of the American Academy of Child and Adolescent Psychiatry, 28(1), 87-92.

Price, R. H., Cowen, E. L., Lorion, R. P., & Ramos-McKay, J. (Eds.). (1988). Fourteen Ounces of prevention. A casebook for practitioners. Washington, DC: American Psychological Association.

Provence, S., & Naylor, A. (1983). Working with disadvantaged parents and their children. New Haven: Yale University Press.

Quinn, P. O., & Rapoport, J. L. (1975). One-year follow-up of hyperactive boys treated with imipramine or methylphenidate. American Journal of Psychiatry, 132, 241-245.

Rapoport, J. L., Quinn, P. O., Bradbard, G., Riddle, K. D., & Brooks, E. (1974). Impiramine and methylphenidate treatments of hyperactive boys. A double-blind comparison. Archives of General

Psychiatry, 30, 789-793.

Ratey, J. J., Mikkelsen, E. J., Bushnell-Smith, G., Upadhayaya, A., Zuckerman, H. S., Martell, D., Sorgi, P., Polakoff, S., & Bemporad, J. (1986). B-Blockers in the severely and profoundly mentally retarded. Journal of Clinical Psychopharmacology, 6(2), 103-107.

Remschimdt. H., (1976). The psychotropic effect of carbamazepine in non-epileptic patients, with particular reference to problems posed by clinical studies in children with behavioural disorders. In W. Birkmayer (Ed.), Epileptic Seizures - Behaviour - Pain (pp. 253-258.) Bern: Hans Huber.

Rieder, R. O., Broman, S. H., & Rosenthal. D. (1977). The offspring of schizophrenics. Archives of General Psychiatry, 34, 789-799.

Ritvo, E. R., Freeman, B. J., Yuwiler, A., Geller, E., Schroth, P., Yokota, A., Mason-Brothers, A., August, G. J., Klykylo, W., Leventhal, B., Lewis, K., Piggott, L., Realmuto, G., Stubbs, E. G., & Umansky, R. (1986). Fenfluramine treatment of autism: UCLA Collaborative study of 81 patients at nine medical centers. Psychopharmacology Bulletin, 22, 133-140.

Roosa, M. W., Sandler, I. N., Beals, J., & Short, J. (1988). Risk status of adolescents: Children of problem drinking parents. American Journal of Community Psychology, 16, 225-229.

Roosa, M. W., Sandler, I. N., Gehring, M., Beals, J., & Cappo, L. (1988). Children of alcoholics life event schedule: A stress scale for children of alcohol abusing parents. Journal of Studies on Alcoholism, 49, 422-429.

Rutter, M. (1985). Resilience in the face of adversity: Protective factors and resistance to psychiatric disorders. British Journal of Psychiatry, 147, 598-611.

Rutter, M. R., & Garmezy, N. (1983). Childhood psychopathology. In M. Hetherington & P. Mussen (Eds.), Manual of Child Psychology (Vol. 4, 4th ed., pp. 775-911). New York: Wiley.

Rutter, M., Tuma, A. H., & Lann, I. S. (Eds.). (1988). Assessment and diagnosis of child psychopathology. New York: Guilford Press.

Sandler, I., Gersten, J. C., Reynolds, K., Kallgren, C. A., & Ramirez, R. (1988). Using theory and data to plan support interventions: Design of a program for bereaved children. In B. H. Gottlieb (Ed.), Marshalling social support, formats, processes and effects (pp. 53-85). Beverly Hills: Sage Publications.

Saxe, L., & Fine, M. (1981). Social experiments: Methods for design

and evaluation. Beverly Hills, CA: Sage Publications.

Saxe, L., Cross, T., & Silverman, N., with Dougherty, D. (1987). Children's mental health: Problems and services. Durham, NC: Duke University Press. [Originally published in 1986 by the Office of Technology Assessment, U.S. Congress, Washington, DC: U.S. Government Printing Office.]

Schaefer, C. E. & Swanson, A. J. (Eds.). (1988). Children in residential care: Critical issues in treatment. New York: Van Nostrand Reinhold.

Schorr, L. B. (1988). Within our reach: Breaking the cycle of disadvantage. New York: Doubleday.

Schweinhart, L. J., & Weikart, D. B. (1988). The High/Scope Perry preschool program. In R. H. Price, E. L. Cowen, R. P. Lorion, & J. Ramos-McKay, (Eds.), Fourteen ounces of prevention: A casebook for practictioners (pp. 53-65). Washington, DC: American Psychological Association.

Seitz, V., Rosenbaum, L. K., & Apfel, N. H. (1985). Effects of family support intervention: A ten-year follow-up. Child Development, 53, 376-391.

Smith, M. L., Glass, G. V., & Miller, T. I. (1980). The benefits of psychotherapy. Baltimore, MD: John Hopkins University Press.

Spitzer, R. L., Endicott, J., & Robins, E. (1978). Research diagnostic criteria. Archives of General Psychiatry, 35, 773-782.

Sprague, R. L., & Werry, J. S. (1971). Methodology of psychopharmacological studies with the retarded. In N. R. Ellis (Ed.), International review of research in mental retardation (p. 148). New York: Academic Press.

Stroul, B. A. & Friedman, R. M. (1986). A system of care for severely emotionally disturbed children & youth. Washington, DC: CASSP Technical Assistance Center.

Sue, S. (1977). Community mental health services to minority groups: Some optimism, some pessimism. American Psychologist, 37, 616-628.

Thurber, S. & Walker, C. E. (1983). Medication and hyperactivity: A meta-analysis. Journal of General Psychology, 108, 79-86.

Wiener, J. M. (1985). Diagnosis and psychopharmacology of child and adolescent disorders. New York: John Wiley & Sons.

Weissman, M. M. (1988). Psychopathology in the children of depressed

parents: Direct interview studies. In D. L. Donner, E. S. Gershon, & J. Barrett (Eds.), Relatives at risk for mental disorders (pp. 143-159). New York: Raven Press.

Weissman, M., Gammon, D., John, K., Merikangas, K., Warner, V., Prusoff, B., & Sholomskav, D. (1987). Children of depressed parents: Increased psychopathology and early onset of major depression. Archives of General Psychiatry, 44, 847-853.

Weissman, M., M., Prusoff, B. A., Gammon, G. D., Merikangas, K. R., Leckman, J. F. & Kidd, K. K. (1984). Psychopathology in the children (ages 6-18) of depressed and normal parents. Journal of the American Academy of Child Psychiatry, 23, 78-84.

Weisz, J. R., Weiss, B., Alicke, M. D., & Klotz, M. L. (1987). Effectiveness of psychotherapy with children and adolescents: A meta-analysis for clinicians. Journal of Consulting and Clinical Psychology, 55, 542-549.

Weisz, J. R., Weiss, B., Wasserman, A. A., & Rintoul, B. (1987). Control-related beliefs and depression among clinic-referred children and adolescents. Journal of Abnormal Psychology, 96, 58-63.

Whitt, J. K. (1984). Children's adaptation to chronic illness and handicapping conditions. In M. G. Eisenberg, L. C. Sutkin, & M. A. Jansen (Eds.), Chronic illness and disability through the life-span: Effects on self and family. New York: Springer.

Wolchik, S. A., Westover, S., Sandler, I. N., & Balls, P. (1988). Translating empirical findings into an intervention for children of divorce. Paper presented at the 1988 national convention of the American Psychological Association, Atlanta, Georgia.

Wolfe, D. (1987). Child abuse. Newbury Park, CA: Sage Publications.

Wortman, P., & Saxe, L. (1982). Methods for evaluating medical technology. In Office of Technology Assessment, U.S. Congress, (OTA-H-181), Strategies for medical technology assessment (pp. 127-149). Washington, DC: U.S. Government Printing Office.

Wright, D. M., Moelis, I., & Pollack, L. J. (1976). The outcome of individual child psychotherapy: Increments at follow-up. Journal of Child Psychology and Psychiatry, 17, 275-285.

Ziring, P. R., & Teitelbaum, L. (1980, September 22-24). Affiliation with a university department of psychiatry: Impact on the use of psychoactive medication in a large public residential facility for mentally retarded persons. Paper presented at the Conference on use of medications in controlling the behavior of the mentally retarded. University of Minnesota, Minneapolis.

CHAPTER 5

RESEARCH PERSONNEL AND INFRASTRUCTURE

No field has a greater or more pressing need to recruit and support researchers than child and adolescent mental health, yet research in this area has almost always lacked the support it deserves and requires, both in professional schools and universities where most research is conducted, and among the private, local, state, and federal agencies that fund research. There are many reasons for this problem, including the stigma associated with mental illness; the relatively low status of those working with children, especially impaired children; and the fact that the disciplines involved have generally concentrated on meeting the enormous need for services rather than undertaking basic research.

The preceding chapters demonstrate that, despite unique challenges, marked progress has been made in diagnosing, understanding, and treating mental disorders of childhood and adolescence. Even so, a considerable expansion is needed in the research community working in this area of inquiry. Numerous disciplines are involved, many of which have critical shortages of personnel appropriately trained to conduct needed research. Specialists need to be trained within those diverse disciplines while efforts are made at the same time to foster cross- and interdisciplinary collaborative research that explores the interfaces of biological, psychological, and social aspects of childhood mental disorders. This chapter describes the research community in child mental health, examines the structural limitations that impede research in this field, and discusses current federal support for such research.

THE RESEARCH COMMUNITY

The work of many disciplines is directly relevant to research on childhood mental illnesses. The clinical realm includes child, adolescent, and adult psychiatry as well as pediatrics, neurology, clinical and developmental psychology, public health, social work, and psychiatric nursing. In addition, for many childhood mental disorders, other professions, such as education, speech and language pathology, and occupational therapy, play important roles.

Basic research in the neurosciences, including molecular genetics, neurochemistry, neuroanatomy, cell biology, neurophysiology, and neuropharmacology, has provided a far more detailed picture of brain function than most people dreamed possible only a few years ago.

Developmental and cognitive psychology continue to explore key areas such as motivation, social and emotional development, language, and conscious and unconscious cognitive processes. Much has been learned about how specific types of brain dysfunction manifest themselves as disordered or unusual behavior or thinking. Social scientists are learning how to define normative interpersonal behaviors and how relationships are formed and social hierarchies established and maintained. Levels of analysis range from the small group through the family, organizations, communities, larger society, and different cultures. Other disciplines, such as economics, epidemiology, anthropology, and statistics, also have valuable contributions to make. Typically, for each of these disciplines, research on mental disorders has focused mainly on those prevalent in adults; yet, in nearly all of these areas, a few researchers are pursuing questions about how conditions differ for the young and what changes occur in the course of development.

No specific information is available about trends in research personnel working in child mental health, but data about mental health research in general are sobering. Notwithstanding the exponential growth in the scientific knowledge relevant to understanding the etiology, course, and prognosis of mental illnesses, the number of individuals entering mental health research careers is insufficient. One measure of this reality is the increasing average age of mental health researchers. At present, the average age of investigators supported by the National Institute of Mental Health (NIMH) and its sister institutes in the Alcohol, Drug Abuse and Mental Health Administration (ADAMHA) is 45 years; that average is increasing at twice the rate for researchers supported by the National Institutes of Health (NIH) (ADAMHA, 1988a).

A delicate balance exists between creating new career pathways and training individuals to follow them. A few years ago, the Institute of Medicine (IOM) estimated the size of the NIH and ADAMHA research training programs needed to support biomedical research in the future (IOM, 1985a). In FY 1986, the number of trainees supported by ADAMHA was 38 percent below the recommended figure; for FY 1989, the predicted shortfall is 56 percent. The IOM report did not explicitly address needs in child research. The committee's assessment of available data, however, is that current training programs are failing to meet the serious need for more child mental health researchers.

The greatest incentive for a career in mental illness research--being at the forefront of the development of new knowledge--is not attracting enough researchers. Moreover, the problem almost certainly will worsen. The rapid evolution of the biobehavioral sciences has created a demand for more specially trained investigators, typically without substantially diminishing the continued needs in well-established research areas. The situation is ominous for ADAMHA research in general, but particularly for areas in which research

advances have been slower, including child and adolescent mental disorders.

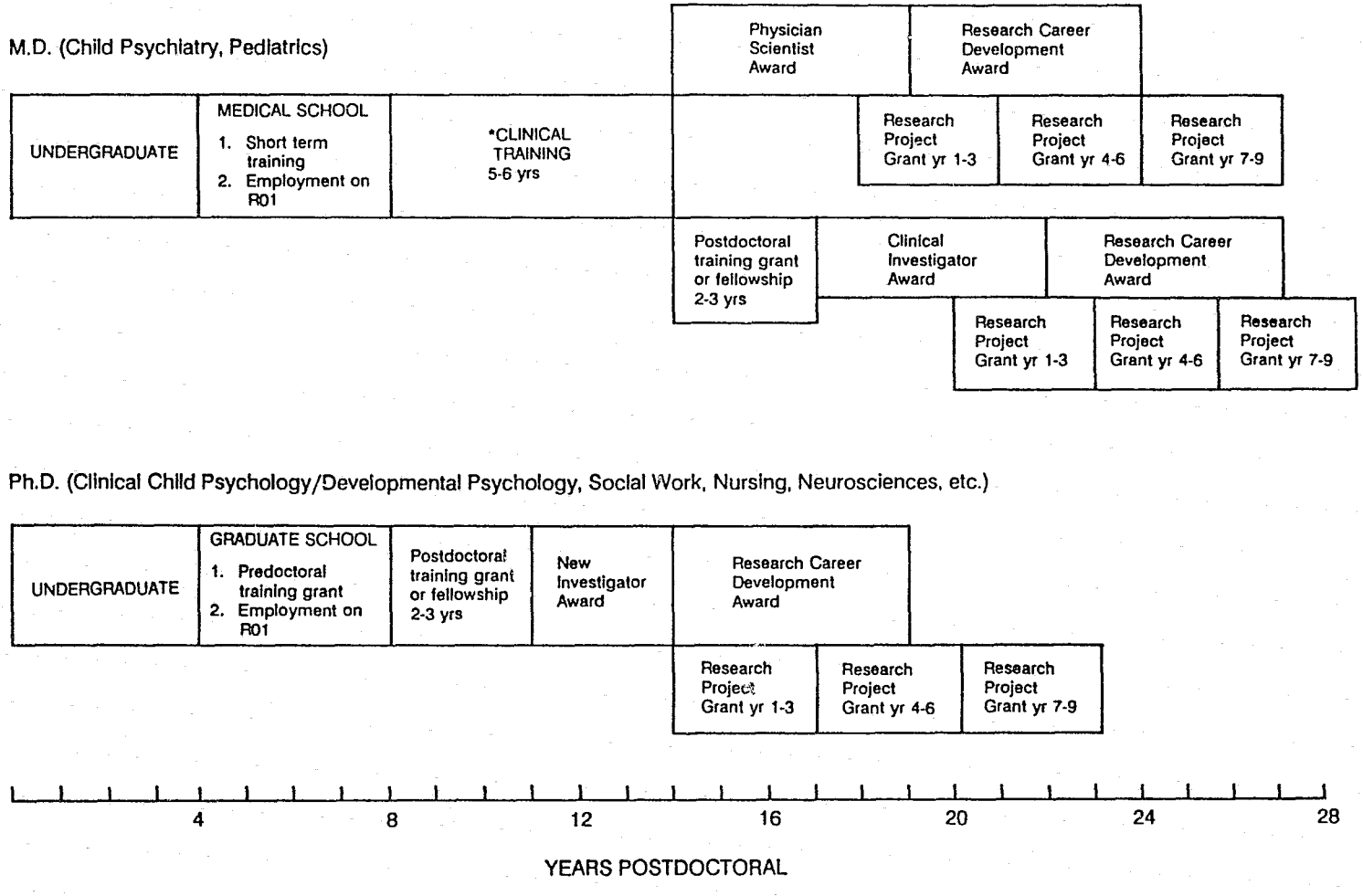
Core Disciplines for Child and Adolescent Mental Health Research

The field of child mental health needs a core around which an aggressive new research effort can coalesce. A cadre of outstanding investigators, research programs, and institutions could provide continuing leadership for a vigorous research initiative. Given the diversity of research needs and opportunities, no single specialty is likely to be the core; rather, that role probably will be shared among several disciplines that have distinct but overlapping areas of interest. The committee believes that academic clinical settings are especially suitable for such leadership roles, because they have both patient populations and research capacity. Several clinical disciplines with a tradition of research are already involved with problems of children and adolescents who have mental disorders. Duration of training and the balance between clinical and research experience vary across the disciplines (Figure 5-1), as do particular competencies, clinical and other emphases, and the number of practitioners involved.

Child Psychiatry

Child psychiatry is a subspecialty of medicine. In the United States, all child psychiatrists are physicians who must complete a residency in general psychiatry as well as training in child psychiatry. Thus, a child psychiatrist typically will have had at least four years of medical school plus five or six years of post-graduate clinical training in general and child psychiatry. The number of child psychiatrists in the United States has been increasing slowly, with about 3,800 in 1986 (Campbell, 1987). Child psychiatry is one of the very few medical specialties that surveys have repeatedly identified as needing to expand in order to meet clinical needs (Graduate Medical Education National Advisory Committee [GMENAC], 1980; American Academy of Child Psychiatry, 1983; Weissman and Bashook, 1986).

Child psychiatry researchers must be principals in child mental health research; their long, broad-based training in both medicine and the behavioral sciences and their clinical competence place them at the center of many types of research involving children and adolescents with mental disorders. At present there are very few academic child psychiatrists in the United States who are able to sustain a major research commitment for more than a few years. Multiple teaching, clinical, and administrative demands are made on these individuals, with the result that fewer than 100 academic child psychiatrists are currently devoting 30 percent or more of their time


M.D. (Child Psychiatry, Pediatrics)
UNDERGRADUATE
MEDICAL SCHOOL
1. Short term training
2. Employment on R01
*CLINICAL TRAINING
5-6 yrs
Physician Scientist Award
Research Career Development Award
Research Project Grant yr 1-3
Research Project Grant yr 4-6
Research Project Grant yr 7-9
Postdoctoral training grant or fellowship
2-3 yrs
Clinical Investigator Award
Research Career Development Award
Research Project Grant yr 1-3
Research Project Grant yr 4-6
Research Project Grant yr 7-9
Ph.D. (Clinical Child Psychology/Developmental Psychology, Social Work, Nursing, Neurosciences, etc.)
UNDERGRADUATE
GRADUATE SCHOOL
1. Predoctoral training grant
2. Employment on R01
Postdoctoral training grant or fellowship
2-3 yrs
New Investigator Award
Research Career Development Award
Research Project Grant yr 1-3
Research Project Grant yr 4-6
Research Project Grant yr 7-9
4
8
12
16
20
24
28
YEARS POSTDOCTORAL

to research; fewer than 20 can be considered full-time investigators, spending 80 percent or more of their time doing research (American Academy of Child and Adolescent Psychiatry, 1989). This represents a major shortage of personnel available for child mental health research (see also Haviland, Dial, and Pincus, 1988; Weissman and Bashook, 1986).

There are several reasons that few child psychiatrists engage in research. Clinical training is long, rigorous, and challenging. Individuals interested in research are often sidetracked into other academic fields or into research in general psychiatry. Only about 4 percent of medical students choose psychiatry as a specialty, and about one fifth of them intend to enter child psychiatry. Of those senior medical students intending to enter psychiatry, 34.6 percent say that they want to pursue an academic or research career (31.2 percent express a broad interest in clinical practice, teaching, and research); 18.1 percent expect exclusive or significant research involvement during their medical career. Thus, child psychiatry researchers are likely to constitute about 0.15 percent of all medical students (Haviland, Pincus, and Dial, 1987).

In general, neither medical schools nor child or general psychiatry residencies provide many opportunities for formal training in research. As a result, at the end of a decade of clinical training, newly graduating child psychiatrists interested in pursuing an academic career are faced with the choice between earning a living as clinicians or pursuing additional postdoctoral training in research, almost always with limited financial remuneration. The typical choice is easily documented (see Haviland et al., 1987, 1988). Even among full-time psychiatric faculty, only 12 percent have had at least one year of postdoctoral research, compared with an average of 34 percent for other medical school faculty in non-surgical clinical departments (Burke, Pincus, and Pardes, 1986).

Clinical Child Psychology and Developmental Psychology

Clinical child psychology is not formally identified as a subspecialty of clinical psychology, but some psychologists do work mainly with children and their families. Clinical psychologists obtain a Ph.D. degree through a combination of course work and clinical experiences and most often have at least two years of postdoctoral clinical training. A relatively new area called developmental psychopathology focuses on how mental disorders manifest themselves within the context of the changes that occur during the course of development. From one perspective, developmental psychopathology is a specific new discipline that has emerged from a fusion of developmental psychology--the "basic" study of normal developmental processes--with clinical psychology--the "applied" study of mental disorders and their treatment. However, the term

"developmental psychopathology" also has a broader use that transcends disciplinary lines, referring to a particular framework that all of the child mental health disciplines can use in considering mental disorders and mechanisms underlying disturbed development.

The shortage in psychology of researchers concentrating on child and adolescent disorders is not as acute as it is in child psychiatry, but there is little room for complacency. Although the number of new Ph.D.s produced each year has remained fairly stable at about 3,000 during the past decade (Howard et al., 1986; Pion, 1988; Stapp, Tucker, and VandenBos, 1985), the majority do not become heavily involved in research careers; even fewer focus on research related to child and adolescent mental disorders. In 1987, slightly over half the new Ph.D.s were in clinical, counseling, or school psychology; 6.5 percent were in developmental psychology. Among new Ph.D.s, between 1983 and 1986, only 14 percent of those in clinical psychology and 46 percent of those in developmental psychology reported spending 20 percent or more of their time in research; only 4 percent of clinical psychologists and less than 20 percent of developmental psychologists reported spending 50 percent or more (Pion, 1988). Furthermore, although precise figures are not available, it would seem that even fewer psychologists are involved in research related to child problems.

Present prospects for increasing the number of psychologists undertaking research careers in child mental health are not encouraging. Between the period of 1975 and 1985, the number of clinical psychologists had increased to more than half of all psychologists (Pion, 1988); however, slightly over one-third of new clinical psychologists in 1983 were trained in practitioner programs rather than in the traditional scientist-practitioner model (Howard et al., 1986; Pion, 1988). Moreover, the greatest increase in new clinical Ph.D.s has come from lower-ranked departments (Howard et al., 1986; Jones, Lindzey, and Coggeshall, 1982; Pion, 1988). Over three-fourths of new clinical Ph.D.s are engaged in the delivery of human services, with little or no research involvement (Pion, 1988).

In developmental psychology, the situation is different. The number of Ph.D.s awarded by departments ranked in the top quartile actually increased slightly in the past decade, even as the proportion of Ph.D.s from these departments declined nationally from 70 percent to 58 percent because of larger increases in lower-ranked departments. In contrast to clinical psychologists, nearly two-thirds of developmental psychologists are employed in university, college, medical school, or other academic settings. In many other areas of psychology from which research contributions related to child and adolescent disorders have come, the number of new Ph.D.s in recent years has remained steady or declined (Pion, 1988). New areas such as behavior genetics, neuropsychology, and health psychology have probably increased their numbers.

In view of recent declines in the number of pre- and postdoctoral research trainees and fellows from the NIMH and other sources, it is interesting to note that the percentage of recent Ph.D.s in clinical and developmental psychology who are heavily engaged in research is markedly higher among psychologists who received federal or private support for their training than among those dependent solely on personal funding (Pion, 1988).

Social Work

Social work makes a substantial contribution to the clinical care of children with mental disorders. More than 200,000 social workers provide a variety of services in various settings (Battle, 1987), with slightly over 25 percent working in the area of mental health (Hopps and Pinderhughes, 1987). Like psychology, social work does not have a child subspecialty; rather, interested trainees can choose programs that emphasize child mental disorders for their clinical activities, or they can select related programs in child welfare or family and children's services. The overwhelming majority of social workers have a masters degree in social work (M.S.W.).

As a field, social work has few academic centers of excellence to train and retain researchers. Even so, social work research has contributed significantly to knowledge about families under stress, substance abuse, delinquency, the organization of social services, foster care, adoption, and other issues pertinent to child mental disorders. Most research in social work is produced by those who have attained a doctorate in social work, either the Ph.D. or the D.S.W. Fewer than 300 such degrees are awarded annually (Rosen, Fanshel, and Lutz, 1987), and only a small fraction of those focus on topics directly relevant to child mental disorders. Hence, social work has a remarkable gap between the number of people who work in child mental health and the number who conduct research relevant to it.

Social workers tend to earn relatively low entry-level clinical salaries, compared with other mental health professionals, so significant financial support for tuition and stipends is necessary to attract and retain talented individuals in training and post-training positions. Furthermore, the field has no strong tradition of clinical investigation in relation to mental disorders of children. The paucity of advanced social work training in child mental health research is due not so much to a dearth of interested and able students as to the lack of financial support for five or six years of postgraduate study and to the fact that few schools of social work have a critical mass of faculty who are engaged in research of any kind, let alone research related to childhood disorders.

Pediatrics

Pediatrics has a strong interest in health promotion and in the prevention of and early intervention in psychobiological disorders of infants, children, and adolescents. The pediatrician is often the first health professional to have contact with a child or adolescent suffering from a developmental or mental disorder. Childhood mental disorders are a very significant part of the pediatric practice, and pediatricians today must be competent to diagnose and manage them. Pediatricians are also concerned with the psychological aspects of chronic illness and handicapping disorders. Because of their early and continuing contact with both sick and well children from various ethnic, socioeconomic, and cultural backgrounds, pediatricians have a major role in child mental health care. Increasing numbers of pediatricians are seeking formal clinical and research training in the psychosocial and developmental aspects of pediatrics (Green, 1983). These pediatric investigators are in a unique position to identify and pursue clinical questions needing further study.

Behavioral pediatrics is a relatively small subspecialty of pediatrics, with only six fellowships programs for advanced training; the emphasis is mainly on clinical applications, not research implications (Haggerty, 1988). Still, it and other subspecialties of pediatrics have a strong tradition of basic and clinical research and offer a source of developmentally oriented research physicians for collaborative research on child mental disorders. Academic pediatrics has recently developed new and imaginative training vehicles for physicians attracted to research careers in academic medicine. Notable among these is the Pediatric Scientist Training Program implemented in July 1987 by the Association of Medical School Pediatric Department Chairmen and partially supported by the National Institute of Child Health and Human Development and a number of private foundations, including the William T. Grant Foundation (Association of Medical School Pediatric Department Chairmen, Inc., 1988).

Interface with Other Applied Disciplines

Other disciplines have a major involvement with children and adolescents with mental disorders, especially in terms of providing care. These disciplines have much to offer, and links between them and research programs on child mental disorders would be invaluable, as would a greater research emphasis within the disciplines themselves.

Child Psychiatric Nursing

Child psychiatric nursing is a relatively small component of the mental health profession. Child psychiatric nurses provide care in

many settings, including hospitals, clinics, schools and other social institutions, and communities. Fewer than 1,000 nurses in the United States have masters or doctoral degrees in child psychiatric nursing (Chamberlain, 1988), and few programs exist in the United States to support such training. Yet, this discipline offers a unique perspective on the mental disorders of the young. Researchers in child psychiatric nursing focus on both children and their families. Research on improving the delivery of clinical services is a natural area of interest, as is the study of the delivery systems through which such care is offered. Also of interest are programs designed to promote early detection of and intervention for developmental problems, especially for children with serious disorders who need prolonged medical care, e.g., premature or addicted newborn babies.

Special Education

Education specialists have major insights to offer about working with the young. Schools are responsible for providing education for all children, including those with mental disorders. Estimated conservatively, at least 10 percent of schoolchildren have persistent emotional disorders (Brandenburg, Friedman, and Silver, 1987). Some of these children are enrolled in special programs within the schools that are led by specially trained educators. Schools provide programs for children who are mentally retarded and for children with a variety of mental disorders such as autism, attention deficit disorders, and many poorly defined disruptive behaviors. For many children with chronic mental disorders, education is the major ongoing intervention available (Saxe, Cross, and Silverman, 1988). Connections between school programs and other disciplines within the child mental health field are scant; little advantage has been taken of research opportunities within such settings.

Other Child Care Professions

Mentally ill children and adolescents are also cared for in nonclinical settings, such as juvenile detention systems and an array of homes and institutions that provide short- and long-term housing for children and adolescents who have failed to do well in more traditional settings, either because of their own behavior or because their parents or guardians provide inadequate care. Too often, the personnel at such facilities must struggle simply to meet the basic needs of their charges and lack the resources or interest to consider possible mental disorders more explicitly. Historically, interactions between researchers and such caregivers and the systems they administer have been characterized more by mistrust than by mutual respect. Yet, the potential benefits of collaborations are so great for both sides that continued efforts must be made to foster them.

Interface with Basic Sciences

Continued efforts are needed at the institutional and national level to facilitate appropriate interdisciplinary collaborations. For example, few forums exist for interested researchers to meet investigators from other disciplines. Most formal mechanisms for presenting scientific findings, namely journals and conferences, are organized along disciplinary or disease-specific lines. Carefully planned efforts to get researchers from different disciplines together, from trainees to senior faculty, should be fostered. Particular support should go to arrangements that ensure that investigators whose interests cross departmental lines have adequate chances for rewards and prestige, including academic tenure.

If clinical departments engaged in research on child mental disorders are to fulfill their mission, they must obtain the active participation of basic scientists, whether they specialize in psychological or social mechanisms or in biological processes. Ties should also be fostered between academic researchers and settings especially relevant to children with mental disorders, including schools, correctional centers, and residential homes. Too often, creative mixtures of basic and clinical professionals doing scholarly work in nonacademic settings fail because no viable career pathways can be forged within them. Appealing and feasible career pathways, including academic tenure, must exist if such innovative efforts are not to be wasted.

Nonclinical academic settings such as schools of public health and departments of psychology, sociology, economics, and anthropology also may be appropriate sites for research centers in child mental health. Especially useful may be collaboration among clinical and experimental psychology programs, schools of education, sociology departments, social work programs, or child development programs. Key figures within schools of public health and departments of economics and epidemiology might also be recruited to these efforts. In addition to the intrinsic value of the research they support, such programs are a powerful way to increase the likelihood that young people will become aware of and be attracted to the multiple fields that focus on childhood mental illness.

INSTITUTIONAL STRUCTURES

Research requires some structural arrangement that, at a minimum, gives access to the population being studied and provides needed facilities and equipment. For stability, research sites typically need incentives to recruit and retain investigators, and many acquire primary and secondary training roles. As noted earlier, the child mental health field has relatively few examples of such complete research structures, although more are maturing each year. This section examines some of the issues that may affect their development.

Barriers to Research Careers

Many factors discourage people from entering research careers related to mental illness. Personal disincentives include the costs of many years of education, the frequent need to obtain and later repay educational loans, and the relatively low stipends accompanying research fellowships. Many institutions lack appropriate mentors to guide the young potential researcher through the long "apprenticeship" that typically precedes an independent research career.

At the institutional level, decreased sources of revenue have forced academic centers to place greater emphasis on responsibilities such as clinical practice and teaching, rather than activities that seek simply to advance knowledge and the scientific endeavor (IOM, 1985b). Faculty may find most students engaged in clinical work or teaching responsibilities and their laboratories lacking vital equipment and space, because no support is available for trainees, or for the facilities and equipment needed for their research. Students often find their mentors in the classroom or clinic, not the laboratory, and may see little evidence that basic or applied research is rewarded.

The low level of support available for established researchers is an important disincentive. Research on mental and addictive disorders has been chronically underfunded for well over a decade (IOM, 1985b)--a reality that can discourage even the most committed researchers. The competition for limited resources has been fierce: in the last five years (FY 1983-87), an average of only 43 percent of all approvable research proposals reviewed received funding from NIMH (ADAMHA, 1988b). The effect on young researchers may well be to discourage them even before their career begins.

Of particular concern to many administrators and researchers that the committee contacted was the lack of progressive research training opportunities that would "track" young future researchers to the point of achieving a first research grant and on into research careers where they could serve as mentors to the next cadre of young researchers. Some steps in this incremental mechanism already exist, but actual award amounts are insufficient to meet either institutional or individual needs, and more slots are needed.

Availability of Research Facilities

Productive research is impossible without appropriate equipment and facilities, yet the vast majority of potential sites for mental health research lack even this fundamental requirement (NIMH, 1988a; National Research Council [NRC], 1988). For example, no more than a half dozen child programs in this nation have laboratories with even the rudimentary equipment required for biological research on brain

development at the genetic, molecular, and cellular levels. Of those, even fewer have the equipment needed to place them in the forefront of existing technology, even though the need to consider developmental change can greatly increase the complexity of the problems under investigation. Comparable problems exist throughout the field. In most institutions, child researchers must compete for funds and space with other, better established programs; distressingly few have done so successfully.

Much of this deplorable lack of facilities and research tools has historical roots. The original impetus to create the majority of child mental health programs was a desire to provide clinical services, not to promote research. Most child programs exist within larger departmental units, many of which have relatively scant space and equipment for research of any type. In the absence of strong incentives, institutions largely elected not to channel valuable and limited resources into child mental health research. Now, even those academic institutions that acknowledge the importance of fostering research on childhood mental disorders lack the resources necessary to provide new, state-of-the-art facilities for researchers. At the same time, the federal government has relinquished the key role it played in so many other areas of research several decades ago, when it regularly granted funds not only to support ongoing research but also to create the facilities and obtain the equipment required for that research. Private foundations and individual donors also seem less enthusiastic than they once were about donating funds for facilities and equipment (NRC, 1988)--and they have never displayed great interest in child mental health (Herring, 1987).

Redressing the general lack of facilities for conducting research on mental disorders in childhood and adolescence will not be easy. The development of appropriate settings probably will entail a partnership among academic institutions, private sector, state and local governments, and some federal agencies. The first step is recognition of the need to develop financial resources for construction or remodeling of facilities. NIMH may need to seek special legislation to permit the use of federal funds for purposes of renovation or construction.

Requirements for research facilities vary widely depending on the research being done. Often facilities cannot be shared easily, so child researchers may need their own. Development of such facilities could be linked to other desirable goals for child mental health research, for instance, creating innovative cross- and multidisciplinary centers of research with superb resources for each of the major research areas.

Special equipment needs include computers with which to facilitate analyses to elaborate and expensive equipment for manipulating genes or studying electrical discharges of single brain cells. This type of

equipment can be very expensive; the equipment for a molecular biology laboratory costs between $200,000 and $1 million (NIMH, 1988a). For some equipment, sharing is feasible and desirable. For example, recent technological advances such as positron emission tomography (PET) and magnetic resonance imaging (MRI) and spectroscopy (MRS) can be shared with researchers working on adult mental disorders, as well as with many other disciplines. Still, if child mental health researchers are to have reasonable access to such equipment, they must be able to help obtain and support it. Although special federal legislation is not necessary to permit expenditures for equipment, funding for research equipment in this area has traditionally been low. There is a need for more resources and flexibility in funding for this type of equipment.

Enhanced Interest in Child Mental Health Research

The general public and many academicians prefer not to think about children with severe mental disorders. Child mental health researchers, therefore, need to tell their colleagues, trainees, and others about developments within the field. Students are apt to be especially receptive to well-executed courses on the importance of child and adolescent mental disorders, the burden of illness they impose, their human impact, and the urgent need for progress. Coupled with that can be the message that many scientific opportunities exist in the field, as evidenced by the impressive progress achieved by a small number of scientists and clinicians who have been working for only a short time. Professional organizations can organize programs and provide materials for individuals to use within their own academic settings. Potentially useful activities for all disciplines in child mental health research include:

- distribution of information to undergraduates;
- participation in admissions committees;
- involvement in teaching and curriculum development;
- maintenance of quality clinical experiences.

Exposure to Child Mental Health Research

Participating in a research experience or coauthoring a scientific paper as an undergraduate or during specialty training is highly correlated with the subsequent decision to pursue a research career (Haviland et al., 1987; Neinstein and MacKenzie, 1989). This suggests that the creation of predoctoral research opportunities could markedly increase the number of people who later enter research. Such experiences can only be provided by research-oriented faculty who have the necessary resources and willingness. Projects can vary from participation in a team to greater levels of independence. Whatever their form, they require good advising, a modest budget for student

research projects, and good facilities. Recognition for students can include prizes or awards, though the best reward is a successful experience that leads, if appropriate, to participation in publication of the results and presentations at scientific meetings.

It is the committee's impression that predoctoral research opportunities are becoming less available, because academic institutions, federal funding agencies, and private foundations have reduced support for this category of training in response to a general scarcity of resources (IOM, 1985b; NRC, 1988; Pion, 1988). It is difficult to imagine a cheaper, more effective way to recruit to the field. NIMH is actively engaged in sponsoring a number of programs that could be used to attract more trainees to child mental health research, including research externships for medical students in the intramural research program in Bethesda (or at other major psychiatric research centers) and predoctoral university fellowships in the neurosciences.

Research Training in Clinical Programs

Most clinical training programs are, at best, neutral toward research; some seem to view research experiences as competitive with the "real" objective of the training. Psychology doctoral programs include courses in research methodology and require a research dissertation; even so, for many trainees in clinical psychology, especially in Psy.D. programs, clinical practice is the dominant goal (American Psychological Association, 1988; Pion, 1988). Few clinical students get formal exposure to such basic research skills as hypothesis construction and evaluation, to the ways in which knowledge develops, or to pressing research problems and opportunities. Even within the clinical domain, students often have no opportunities to consider how knowledge accumulates and how they best can assess new findings as they emerge.

As noted earlier, child psychiatrists in particular have limited research training (Haviland, et al., 1988). Psychiatry has never been especially prominent in programs that support combined M.D.-Ph.D. training. NIMH has recently established such a program, which might be an excellent opportunity for child mental health, as well.

DOING RESEARCH WITH CHILDREN

One impediment to child mental health research is the widespread fear that it cannot be done ethically. Research on childhood mental disorders, like all clinical research, entails a balance between attention to the needs of current patients and interest in what can be done for future patients. Further, research must be guided by the highest concerns for the rights of the individual and the ethical

responsibilities of investigators. Unique issues are raised in the course of research on children, including the role of parents in providing consent, the differing degrees to which children can be informed about what is planned, and the varying capacity of children to assent meaningfully to participation. All of these issues are affected by the degree to which any particular research project creates risk, offers potential direct benefits for the children involved, and advances knowledge more generally. Often, the fact that the child is still developing complicates assessment of risk, for example, because long-term effects of an intervention may not become apparent until years later.

For many years, researchers and parents alike have been concerned about the possible effects of "labeling," if children are identified early on as having a mental disorder. More recently, this same concern has taken a slightly different form as a result of work on molecular genetics and biological markers: What are the ethical implications of identifying children who are only at risk for developing a disorder, whether it is diabetes or depression?

Ethical concerns about these and many other issues deserve and are receiving careful attention. In fact, thoughtful consideration of such issues facilitates the conduct of rigorous, high-quality research. Fortuitously, new diagnostic measures, such as biochemical tests done on small amounts of blood, computer-analyzed EEG recordings of the electrical activity of the brain, and magnetic resonance imaging (MRI) and spectroscopy (MRS), already offer or hold great promise of significantly enhancing opportunities to study the functioning brain with little or no risk. Furthermore, the discovery of more and more effective forms of therapy is altering the balance between risks and benefits for treatment research in some disorders.

Some ethical concerns are themselves ripe for research. For example, little is known about the process of consent, by which patients and their parents ally themselves with an investigator. Similarly, devising ways of enhancing the consent process, so that subjects are optimally informed in a way that is integral to the research process, would be enormously beneficial for all research. Institutional review boards can be extremely helpful in facilitating open discussions of these issues and urging exploration of them in appropriate contexts.

FEDERAL SUPPORT FOR CHILD MENTAL HEALTH RESEARCH

Problems of children are of potential interest to many federal agencies. For example, the Department of Education addresses problems of children with emotional or developmental difficulties that interfere with learning; the Office of Children, Youth, and Families in DHHS has programs for delayed and deprived children, including Head

Start; Maternal and Child Health in HRSA works to prevent problems and has especially close ties to pediatrics; the Justice Department must cope with children who violate societal norms; and other agencies deal with issues of developmental disabilities, rehabilitation, and entitlement programs. However, none of these agencies have shown a strong or consistent interest in children and adolescents with severe mental disorders.

A few federal agencies directly or indirectly support research relevant to childhood mental disorders. Two of the National Institutes of Health (NIH) focus on development and disorders of brain function in children. The National Institute of Child Health and Human Development (NICHD) has taken a leadership role in funding studies of child development and disruptions of it, especially mental retardation, and in fostering research in the subspecialty of behavioral pediatrics (Herring, 1987; NICHD, 1988). The National Institute of Neurological Disorders and Stroke (NINDS) includes in its neuroscience research program a focus on developmental disorders of childhood such as autism and communicative disorders (Herring, 1987). Within ADAMHA, both the National Institute on Drug Abuse (NIDA) and the National Institute of Alcoholism and Alcohol Abuse (NIAAA) sponsor some research on adolescents and substance abuse, especially prevention of abuse (Department of Health and Human Services [DHHS], 1987; DHHS, 1988; Herring, 1987; NIDA, 1988). None of these agencies takes as part of its mandate a responsibility for promoting more general research on child mental disorders. That role, within the federal government, falls entirely to NIMH (Herring, 1987).

NIMH is the federal agency that has most dramatically fostered and shaped research on mental disorders. Mental health researchers look to NIMH not only for direct financial support but also for leadership in setting an agenda for mental health research. Its intramural programs, clinical and basic, were the training grounds for many of the most successful researchers in the field and retain an important role in training new generations of researchers. To date, the success of NIMH in fostering child mental health research has been less dramatic than in some other areas. Directors of NIMH have repeatedly expressed interest in the mental health of children and youth, yet NIMH has had a specific program in child mental disorders only for a few years and has not yet appointed a permanent head to its extramural Child and Adolescent Disorders Research Branch. Similarly, NIMH has no intramural biological research laboratories that focus mainly on developmental aspects of mental disorders, and it has only two intramural child clinical research programs--one on certain child mental disorders and one developmental research with clinical implications (Herring, 1987). The following sections review various mechanisms by which NIMH supports research on child mental disorders.

Support of Research Training

As noted earlier, support for research training in child mental health is neither broad nor deep. In the main, training support comes from NIMH, with limited funds from the other ADAMHA institutes and from NIH for those future researchers whose training objectives cut across disorders.

NIMH has a range of mechanisms to support research training and further development along a research career (see the Appendix to this chapter). Only one of these is specifically intended for child researchers, but the committee believes that, generally, the quality and diversity of the research training mechanisms, though not the level of support, are sufficient to meet the needs of the field.

Current Funding for Research Training in Child Mental Health

A review of the actual numbers of trainees and young investigators being supported by NIMH reveals the generally impoverished state of the research training and career development programs for mental health researchers. NIMH supports research trainees both through its general research budget and through a congressionally mandated program, the National Research Service Award (NRSA). Between 1981 and 1985, NRSA positions dropped from 1300 to 996. For FY 1985, 70 (7 percent) of the awards went to physicians; the next year, 929 NRSA trainees and fellows were supported, of whom fewer than 50 appear to have been physicians. The appropriations for 1989 support 837 NRSA trainees and fellows. In fiscal year 1988, NIMH had a research training budget of $19 million. Support for research training specifically focused on child and adolescent mental disorders totaled $1.5 million. As far as the committee has been able to determine, the only NRSA awards in 1988 for research training related to child and adolescent mental disorders were seven institutional awards, which covered 35 trainees, and three individual awards. These awards were funded by the Child and Adolescent Disorders Research Branch at NIMH. There has been little growth in this area over the past three years (NIMH, 1988b).

Weaknesses of the NRSA Program

The NRSA program has been quite beneficial for the mental health field, including child mental health research. However, several difficulties markedly limit its current usefulness (Haviland et al., 1987). Some of these problems can be corrected administratively; others will require legislative action. Although these problems are not unique to child mental health trainees, the committee addresses them because of the importance of these training funds.

Indebtedness can greatly influence both the likelihood that someone will consider a research career to begin with and the ability of a trainee actually to enter an academic research position once training is completed. Typically, junior research positions in academic settings pay substantially less than do clinical or nonacademic jobs. For some research areas with critical personnel shortages (e.g., AIDS), trainees going into research are forgiven a portion of their educational loan debt. No such arrangement currently exists for child mental health research.

With existing NRSA regulations, trainees in clinical programs may participate in research only if they take time off from their clinical training or delay research training until after the clinical training is over, thereby markedly lengthening their time as trainees. It should be possible to develop ways of melding research and clinical training when appropriate.

Stipends remain low, creating a situation in which potential researchers are asked to extend their education, during which time they receive relatively little financial support, so that they can enter a career that almost certainly will pay less than other career pathways within their discipline. Realistic assessments, with periodic adjustments for inflation and other factors, are needed for stipends within each field, using as a basis for comparison other types of training experiences.

Little attention has been given to the creative use of short-term NRSA grants aimed at undergraduates, medical students, and predoctoral researchers. The importance of the broadened exposure to research that could be achieved by expanding and publicizing this program cannot be overstated. At a small cost, such programs can greatly enhance the ability of established investigators to interact with and encourage potential researchers early in their careers.

Insufficient recognition has been given to the real costs of training. Academic institutions currently bear hidden and overt costs of training grants such as the NRSA awards, including particularly the costs of teachers and mentors for the programs. Increasingly, especially in clinical disciplines, faculty members have scant free time to devote to teaching, and must either sacrifice their own research time or elect not to teach.

Support of Research Career Development

Table 5-1 summarizes NIMH support for research career development awards in the area of child and adolescent mental health. These programs have had an enormous impact on research dealing with mental illness. The NIMH research budget for fiscal year 1988 was $345 million, supporting over 1,260 research grants and awards. Of this,

Table 5-1: NIMH Research Career Development Awards in Child and Adolescent Mental Disorders, 1986-1988

ADMINISTRATIVE UNIT	1986	1987	1988
CHILD/ADOLESCENT DISORDERS			
RSDA-I	2	3	2
RSDA-II	3	6	6
Research Scientist	1	1	1
Clinical Investigator	2	1	0
Physician Scientist	1	4	5
Subtotal	9	15	14
OTHER			
Epidemiology	*	*	1
TOTAL	9	15	15

*Data unavailable.

$11.5 million went to support 187 career development awards, with only $0.9 million going to support the development and stabilization of careers of investigators in the child mental disorders area.

Because NIMH is currently reorganizing them, the committee decided not to attempt a detailed assessment either of the existing mechanisms or of possible replacement mechanisms. However, a few general issues are worth emphasizing.

No mechanisms exist to ensure that appropriate numbers of researchers are being supported at all career stages. Over the past several years, few awards have been available, and the committee has the impression that these have most often gone to established investigators, because their experience makes them more competitive. Both criteria for making the awards and mechanisms for selecting awardees should foster fair selection at each career level.

At present, the research scientist award system lacks a clear organizing structure with linkages among the programs that could provide a career path for talented young researchers. Such a structure well might improve the chances of retaining young people long enough for them to become independent researchers. Especially important are early development awards that can accommodate varying

levels of research training among disciplines. Also, methods should exist for somewhat more advanced researchers to seek supplemental training in relevant areas. Done properly, these programs could provide stable funding for at least 5 years for the most promising young researchers, thus freeing them from the repeated frustrations and conflicts of unfunded research in the early years. Young trainees could be judiciously matched to centers of excellence; such an effort could be begun by broadening training opportunities at centers, as NIMH has done in its prevention intervention centers.

These awards are intended to guarantee research time for young investigators, usually at least 75 to 80 percent. However, actual stipends often do not cover the allotted salaries, putting the researcher or the institution in the difficult position of finding additional funds from nonfederal sources. The committee discovered that several leading academic institutions have serious reservations about allowing faculty to apply for these awards because of the financial liabilities the institutions incur. Regular review could ensure that stipends for each discipline are realistic and appropriate.

The committee found no federal grant mechanisms designed to support researchers who have demonstrated excellence in both research and teaching. A program, perhaps patterned after the Hazen Foundation award (Renz, 1986), that has supported both an established researcher and one or more trainees could be invaluable. Such a program would be a wonderful opportunity to explicitly acknowledge outstanding research mentors in the field while giving them the freedom to select the best trainees to work with them.

Support for Research

NIMH has employed diverse funding mechanisms successfully, among them small grants, new investigator awards, individual research grants, program project grants, research scientist awards, clinical research centers, and cooperative agreements for collaborative studies. Over the years, these multiple mechanisms have proven their value in supporting a variety of research efforts organized in many ways. Peer review of investigator-initiated proposals remains the most acceptable and effective way known to assign priorities for funding.

Current Levels of Funding

Table 5-2 summarizes NIMH support for research on child mental disorders since 1984. These figures are based on information supplied by the various components of the NIMH and do not necessarily reflect a uniform definition of what constitutes relevant research. However,

TABLE 5-2: NIMH Research Funding for Child Mental Health, 1984-1988[a]

ADMINISTRATIVE UNIT	FUNDING (in millions of dollars)				
	1984	1985	1986	1987	1988
CADRB[b]	$ 7.3	$ 9.4	$10.4	$13.3	$14.8
Clinical Centers	0.5	0.8	0.6	0.6	0.4
Prevention	4.6	5.0	4.5	4.9	5.5
Epidemiology	1.1	2.1	2.2	2.2	3.2
Basic Behavioral Sciences	7.2	8.8	15.8	10.5	10.0
Developmental Neurosciences	2.0	2.6	2.9	3.4	4.3
Special Populations[c]	3.6	5.3	4.0	4.3	3.1
Intramural	5.1	5.5	3.4	3.8	4.5
TOTAL	$31.4	$39.5	$43.8	$43.0	$45.8

a All amounts include Research Career Development Awards and Institutional Research Training Grants, when applicable.

b All research projects listed for the Child and Adolescent Disorders Research Branch (CADRB) deal with DSM-III or DSM-III-R disorders. Prior to FY86, such projects were supported across several branches of the old Division of Extramural Research Programs.

c This category includes some research from the Minority Research Center in FY84 and FY85; for FY86, FY87, and FY88 it reflects research on antisocial and violent behavior exclusively.

they do offer a reasonable picture both of the overall level of support and of the distribution of that support across major research areas. In general, grants supported by the Child and Adolescent Disorders Research Branch deal with assessment and intervention for defined mental disorders; those supported by other parts of NIMH relate to the special focus of that branch or division. After a

substantial increase in FY 1985, funding increases have not kept pace with inflation, and many components of NIMH have not increased their support of child research at all.

Weaknesses of Existing Funding Mechanisms

After surveying researchers in the field, the committee identified several concerns about current granting practices. Not all of these are unique to child research, but their adverse cumulative impact on the field seems to be substantial.

Many investigators in the child mental health field emphasized the need for more appropriate mechanisms for peer review of research proposals. NIMH grant proposals are typically considered by peer review committees that fit broadly into one or more related traditional disciplines. As a result, grant applications within the child field may fall within the domain of many different committees; for example, in 1987, grants administered by the Child and Adolescent Disorders Research Branch were reviewed by 11 out of 20 such review groups. Typically, each group has one or two people who have expertise in areas relevant to child mental disorders. The committee found a strong consensus within the field for the creation of one or two research review committees explicitly for child mental health. Such review groups, which could include researchers from various disciplines in the field, would be attuned to the many unique aspects of doing research on child mental disorders.

Researchers indicated that granting cycles are often too short to permit reasonable research progress. Most NIMH grants support research that takes several years to complete. Grants funded for more than one year are reviewed annually for scientific merit, but the investigator does not compete with new grants until the end of the full funding period. In the past, grants typically received funding approval for five years. Because of the scarcity of resources for research, grants for more than three years are now rare. For some research projects, shorter funding cycles have proved to be reasonable and appropriate; however, for others, they have been burdensome. Longitudinal studies, which can be especially useful in child research, are a case in point: having only two to four grant cycles during a 10- to 20-year project fosters stability. Most prospective studies, for example, those involving risk-factor analysis or randomized treatment outcome, need three to five years of support for implementation, data gathering, and analyses.

Another consequence of scarce resources seems to have been the loss of funding for early exposure of undergraduates, graduate students, and medical students to clinical and basic research opportunities. Researchers reported that these typically "unnamed

slots" in grant proposals are easy targets for cost savings. Yet, as noted earlier, they provide incomparable recruitment opportunities at relatively minor expense.

Clinical investigators noted that one clear need for certain types of research on severe child mental disorders is bed costs. Some studies can be performed only with the careful observation and control made possible by hospitalizing a subject, usually for a few days to several weeks. The cost of hospitalization is substantial, and funds for hospital-based research are increasingly scarce. For example, most hospitals charge between $600 and $1,000 per day, so setting a single bed aside for research for one year would cost $219,000 to $360,000--two to three times the average total cost of most grants in the child field. NIMH has created highly successful mental health clinical research centers (MHCRCs) for adults, but budgets for those centers typically do not include bed costs, and only one center studies children. Some of the most successful MHCRCs are affiliated with Veteran's Administration Hospitals, which cover the cost of hospitalization; however, children are not eligible for such services. In contrast, NIH supports costs for over 600 research beds across the country (IOM, 1988).

A number of administrators and researchers within the child mental health field emphasized the need for more appropriate settings for clinical research. Valid clinical research needs long-term, well-organized facilities with ready access to appropriate subject populations; reliable rating scales for relevant behaviors and psychological states; resources for analyzing large amounts of complex data; and close attention to, as well as funds necessary for, maintaining good care of study volunteers. Few sites appropriate for such research on children exist. It may be necessary to examine models different from those used for adult MHCRCs, including centers that work predominantly with outpatients and centers located in non-patient settings such as schools, correctional institutions, or other institutions that provide care for children with mental disorders.

Clinical and basic researchers alike emphasized the importance of NIMH sponsoring certain types of basic research in the biological, social, and psychological sciences. Appropriately, the research efforts within the NIMH mandate have goals that go far beyond treating specific mental disorders. Basic scientists are asking questions about such fundamental aspects of human existence as learning, sleep, aggression, and the details of psychological and social development. Much of that work is supported by other agencies, but there is a consensus in the field that NIMH can and should provide some support for such work, especially when it offers promise for clarifying mechanisms relevant to mental disorders.

Conclusions

In surveying the field, the committee was struck repeatedly by the consistent message across disciplines and areas of research interest. Few trainees select child mental health as an area of research interest, and those who do find substantial obstacles to pursuing a research career in that field. As part of a national plan on child and adolescent mental disorders, changes are needed in current structures, both to create viable academic research careers in child mental health and to enhance training opportunities for such careers.

The committee believes that highest priority should be given to supporting well-trained investigators at the beginning of their careers, so that they can establish a research program within the academic setting. Mechanisms for support must provide realistic stipends to free young researchers from overwhelming clinical or teaching responsibilities, help them acquire necessary research facilities and equipment, and enable them to obtain, as needed, supplemental research skills.

As such career pathways become available, training programs will need to expand. Again, equitable stipends that recognize overall levels of experience and prior education costs as well as financial incentives of competing career opportunities, are essential. A mix of training opportunities, some institutionally based and others awarded to deserving individuals, will be necessary to meet the varied training needs across disciplines and research interests.

Of course, the program recommended will cost money. Budgetary issues are discussed in Chapter 6. However, it is important to note that the investments in research personnel and infrastructure are key elements to a successful research plan on child and adolescent mental disorders. Realization of the enormous potential for advances in the field hinges on society's ability to attract bright, appropriately trained investigators to the field of childhood mental disorders.

APPENDIX

RESEARCH TRAINING RESOURCES

Two primary support mechanisms for research training and career development exist within the budgets of the different ADAMHA and NIH institutes: the Congressionally-mandated research training line item (National Research Service Award [NRSA] Program) and the Research Scientist (Career) Development Award Program, found within the research budgets of each of the institutes. A third mechanism--albeit limited in opportunity to a handful of young scientists each year--lies in the Intramural Research Programs of each of the institutes. Moreover, some of the NIH and ADAMHA institutes have established special research training programs that remain distinct from both the career development program and the NRSA Program.

ADAMHA Research Training Opportunities

The ADAMHA institutes and NIH maintain a variety of programs available to pay stipends or salaries in support of research trainees whether at the undergraduate, graduate or postdoctoral levels. The following programs are supported under research training line item..

National Research Service Awards

Congressionally appropriated and defined research training is supported predominantly by the National Research Service Awards program, itself segmented into institutional and individual awards.

Institutional awards are support-approved training programs within a specific institution, typically in an academic setting, for a specific discipline at the undergraduate, predoctoral, or postdoctoral level. Most institutional awards include funds for stipends for trainees who are selected by the training program and trained within that institution. The program, intended to support full-time training opportunities, allows up to five years of support for predoctoral trainees and three years for postdoctoral trainees. Stipend levels vary with the years of education and previous training.

Individual fellowships are granted by NIMH to specific individuals who have applied directly for research training support. Trainees seeking this full-time predoctoral or postdoctoral research training support must have identified an appropriate sponsor or mentor who will supervise the training experience. Predoctoral applicants may apply only after two years in a graduate program. Both predoctoral and postdoctoral fellows may be supported for up to three years. In addition to a stipend that is graduated based on length of

training, an institutional allowance of up to $3,000 is provided to offset costs associated with travel, tuition, equipment, and research supplies.

Short-Term Research Training

Predominantly used at the postdoctoral level but available at all levels of pre and postdoctoral training, a limited number of short-term research grants are available through institutional awards. Awardees are selected by the director of the particular institutional training program and may receive support for up to three months of specialized research training. Stipends, although prorated, are consistent with the levels available for other NRSA programs.

None of these awards is available to students in programs leading to professional degrees or to those in a physician residency. Thus, the program is intended to supplement, not supplant, the full-time general residency, medical school, or doctoral degree course of study.

Although stipend levels have been increased, they remain substantially below the level of pay scales for comparably trained professionals both for basic researchers and for clinicians. The annual stipend for predoctoral individuals at all levels of experience is $8,500 for 12 months of training. Postdoctoral stipends range from $17,000 to $31,500 per year, depending on the level of relevant experience (defined to include activities beyond the doctoral degree such as internship, residency, teaching, or clinical work). To the extent possible, departments supporting fellows or institutional awardees supplement the NRSA stipends.

NRSA institutional award or fellowship recipients (but not short-term research training award recipients) become encumbered by a payback requirement under which they must either engage in research or teaching for a period of time equal to the duration of support less 12 months, or repay a portion of the amount provided under the award.

Minority Research Training Awards

The ADAMHA institutes as well as the NIH provide special opportunities for research training for minorities, defined to include American Indian or Alaskan Natives, Asian or Pacific Islanders, Blacks, and Hispanics.

Minority Fellowship Program (MFP) Professional societies, academic institutions and other organizations are provided NIMH-specific grant funds to select and support minority graduate students and others interested in research careers in NIMH areas of interest. Support

under these awards may extend for five years at a rate of $8,500 per year. Among the institutions receiving MFP support are the NASW and the American Psychological Association. An RFP has not been instituted for an MFP in psychiatric research that crosscuts areas of current NIMH interest.

Minority Access to Research Careers (MARC) Grants are made to colleges and universities with high minority enrollments to establish research training programs for third and fourth year undergraduates that will enable them to assist in qualification for doctoral programs in research sciences. The grantee institutions select the trainees and provide up to $5,004 per year in stipend for up to two years of training. A second ADAMHA-supported MARC program, the Faculty Fellowship Program, makes awards to faculty from colleges and universities with significant minority enrollment for advanced training in ADAMHA-related areas. The applicant must have been accepted to an advanced degree program away from the home institution and must agree to return to the home institution at the end of the training experience. Stipends not to exceed $30,000 per year, and an additional $5,000 per year for related expenses, may be provided.

With the exception of the MARC undergraduate honors program, the minority research training programs require the same payback of the training support through time or dollars as is required under the NRSA program.

Career Development Programs Supported under Research Mechanisms

A variety of career development awards are supported under the research budgets of the ADAMHA institutes. If the RSDA and other research training programs educate the future researcher, the career development programs provide support for supervised and first research activities conducted in a somewhat sheltered environment. According to ADAMHA, the awards are to foster the development of outstanding scientists by enabling researchers to engage in research on an essentially full-time, long-term basis.

In the past, three programs have been used as mechanisms for supporting the career development of researchers. These programs--the Physician Scientist Award (PSA), the Clinical Investigator Award (CIA), and the Research Scientist Development Award-Level I (RSDA)--have recently been replaced by the ADAMHA Scientist Development Award and the ADAMHA Scientist Development Award for Clinicians. According to ADAMHA, the intent of the two new programs is to provide opportunities for new researchers and clinicians to "expand their potential for making important contributions to the fields of alcoholism, drug abuse, or mental health (ADM) research."

They both provide salary support of up to $45,000 plus research and/or career development expenses for five years to institutions on behalf of individuals who show a commitment to embarking on a career in ADM research. The PSA, CIA and RSDA award programs will be phased out when current projects are completed. The new award programs began accepting grant applications as of March 15, 1989.

The supporting tables in this chapter are based on information gathered about the old programs since they were the only mechanisms available for funding research career development prior to March 1989. A description of each of the old programs is presented below to allow the reader who may be familiar with these programs to put the new programs in perspective.

Physician Scientist Award (PSA)

Awarded by NIMH alone of the three ADAMHA institutes, the PSA is designed to encourage newly trained physicians to enter research careers focused on the interface of basic and clinical sciences. It enables such physicians to undertake up to five years of specialized study in basic and clinical science with a supervised research experience. The first two to three years include both didactic study and research; the final two to three years are devoted to research under the guidance of a mentor. Candidates must have completed at least two postgraduate years of clinical training to apply. The nonrenewable award requires that a minimum of 75 percent of effort must be devoted to research development activities. While the salary derived from the NIMH funding may not exceed $30,000 per year, plus fringe benefits, NIMH encourages supplementation from nongovernment sources such as sponsoring academic departments. Up to $10,000 per year may be requested for research project requirements and related support.

Clinical Investigator Award (CIA)

This NIMH-specific award is intended to develop clinician-scientists by providing three years of intensive, supervised research under the guidance of a research preceptor. Clinical psychologists, physicians, social workers, or nurses are encouraged to apply in such priority areas as: schizophrenia and major affective disorders; childhood and adolescent psychopathology; clinical epidemiology and clinical services research; and post-traumatic disorders. Up to three years of support are provided for research under the guidance of a preceptor who is an outstanding active researcher and who has knowledge, background and research experience required to be a mentor in the field. Salary support may be requested up to a maximum of $30,000 per year. Up to $15,000 annually may also be requested for supplies, tuition, equipment, travel, etc.

Research Scientist Development Award (RSDA)/
Research Scientist Award (RSA)

These are two complementary programs that provide grants to institutions on behalf of specific individual researchers. The RSDA is a two-part program designed to support those with outstanding research potential who need further supervised research experience (or who may have trained in one discipline and want supervised research experience in another). Level I of the RSDA is designed to provide the supervised research experience noted above. At Level II, support is geared toward individuals capable of designing and conducting original research, but who need additional research experience in order to reach their potential as outstanding scientists. An applicant for a Level II award must have either completed a Level I award successfully or be able to demonstrate significant independent research capacity. Awards under both Levels I and II may be made for up to five years each. Candidates may request up to $45,000 per year for salary and an additional sum for fringe benefits, based upon the institution's salary base.

Research costs may be supported at up to $10,000 per year for up to five years for Level I awardees; and $10,000 per year for up to two years for Level II awardees. Level I candidates may also request up to $5,000 for supervision of research and activities to enhance research skills.

The Research Scientist Award is designed to support outstanding senior investigators in order to enable them to spend full time in research. It provides five years of salary support that may be renewed subject to competitive review at the end of each five year project period. Up to $45,000 per year may be requested.

Other ADAMHA Research Training Opportunities

First Independent Research Support and Transition (FIRST) Awards

These are individual awards designed to provide an initial period of research and salary support for a newly independent behavioral, clinical, or biomedical researcher. The goal of this relatively new (1987) program is to provide a young researcher the opportunity to build a research base leading to the capacity for competitive research support under traditional research mechanisms. Up to $350,000 is provided for project periods of up to five years. Priority areas for these awards include schizophrenia and affective disorders as well as disorders of children and youth.

Small Grants

Up to $50,000 per year may be available for two years of support for less experienced investigators, for investigators in small colleges, or for experienced researchers wishing to conduct pilot studies.

Research Associates and Research Assistants

Trainees and young researchers may be hired by principal investigators holding either project grants or center grants from ADAMHA agencies. Openings and salaries are negotiated directly with the principal investigator but are generally based directly upon university salary scales for such individuals. Summer research assistant opportunities are available at a number of centers for particularly motivated predoctoral and medical student candidates. NIMH's prevention intervention centers make use of year-long preceptorships for young researchers primarily at the postdoctoral levels.

Faculty Development Awards

Specialized awards in child and adolescent mental illnesses and in geriatrics are available to encourage the development of senior academic faculty expert in these areas. While not directly serving a research development capacity, these awards help establish the base of academic mentors for research trainees in these fields.

ADAMHA Intramural Program

ADAMHA's three Intramural Research Programs (IRP) provide another opportunity for research training through a variety of fellowships and appointments.

Medical Staff Fellows

This highly competitive two-year program selects candidates based on demonstrated excellence in research or in a clinical discipline, and utilizes a matching program not unlike the residency match. Historically, appointments to the IRP have been highly prized, and the pool of applicants has been increasing, notwithstanding the somewhat lower support levels. Stipends range from $30,000 to $32,000 in the first two years. In general, interested residents are encouraged to apply during PY-3 or PY-4. Because the IRP is accredited to provide training, residents may take their PY-4 year at the IRP in lieu of their home institution.

Institutional NRSA Appointments

These appointments, which are available through the IRPs, count toward the payback requirements of the NRSA awards. The IRP NRSA program is under the aegis of the NIH rather than the ADAMHA institutes.

NIH-Howard Hughes Medical Institute

This program for medical students provides 9 to 12 months of stipended direct research experience in one of the 1,000 NIH/ADAMHA intramural research laboratories. Students under this program work under IRP preceptors and gain early exposure to biomedical, clinical, and behavioral research.

Research Training Opportunities External to ADAMHA

A number of the NIH institutes and other federal agencies maintain research training programs that extend somewhat beyond those available through the ADAMHA institutes. While they are not all targeted to the field of child and adolescent mental disorders research, they may serve as models for future ADAMHA research training initiatives in this area. The NIH also maintains a commitment to the same research training and career development programs that are utilized by the ADAMHA institutes.

National Institute on Aging (NIA)

NIA maintains two special programs that are directly applicable to child and adolescent mental disorders research training: 1) the Complementary Training Award for Research on Aging; and 2) co-funded Positions on NRSA Awards. The first award enables well-established research training programs to increase their efforts to train investigators for careers in aging through the addition of a special training program supported by the NIA. The second allows NIA to fill approved but unfunded training positions through institutional research training grants that are funded by other NIH institutes. The focus for each position is limited to specified disciplines and fields relevant to research on aging.

National Institute on Allergy and Infectious Disease (NIAID)

NIAID maintains a two-part program designed for college students, predominantly minorities, to become exposed to biomedical and behavioral research. Phase I of the program, "An Introduction to Biomedical Research," is a three-day program designed to inform

students of career opportunities in the field of biomedical research. Conducted on the NIH campus, the program provides lectures, a tour of NIH facilities, and a stipended 6 to 8 week summer experience for 15 college-age students at an NIAID research laboratory.

NIH Division of Research Resources

Special Emphasis Research Career Awards provide individuals who have already earned doctoral degrees the opportunity to acquire the experience necessary for a multidisciplinary approach to the study of a specific disease or medical problem. In the initial phase, the awardee is expected to develop capabilities in fundamental, applied and/or clinical research. In the final phase, the awardee is expected to undertake a multidisciplinary program in a specific disease area. Former and current principal investigators of a federal research grant are ineligible.

Veterans' Administration (VA)

The VA maintains a small research training program for physicians and other scientists working within the VA, which can supplement ADAMHA or other federal research training efforts.

References

Alcohol, Drug Abuse, and Mental Health Administration. (1988a, March). Age trends of ADAMHA principal investigators. An ADAMHA Program Analysis Report (No. 88-10) from the Office of Extramural Programs, Division of Program Analysis, Rockville, Maryland.

Alcohol, Drug Abuse, and Mental Health Administration. (1988b). Hearings for 1989 appropriations. House of Representatives, Subcommittee on Appropriations, 100th Congress, 2nd Session, Part 3, p. 335.

American Academy of Child Psychiatry. (1983). Child psychiatry: A plan for the coming decades. Washington, DC: Author.

American Academy of Child and Adolescent Psychiatry. (1989). Report of the task force on scientific affairs. Washington, DC: Author.

American Psychological Association. (1988). Graduate study in psychology and associated fields. Washington, DC: Author.

Association of Medical School Pediatric Department Chairmen, Inc. (1988). Pediatric scientist training program announcement. Denver: Author.

Battle, M. G. (1987). Professional associations: National Association of Social Workers. In A. Minahan, (Ed.), Encyclopedia of social work, (18th ed., Vol. 2, pp. 351-366). Silver Spring, MD: National Association of Social Workers.

Brandenburg, N. A., Friedman, R. M., & Silver, S. (1987, July). The epidemiology of childhood psychiatric disorders: Recent prevalence findings and methodological issues. Tampa: University of Florida, Florida Mental Health Institute.

Burke, J. D., Pincus, H. A., & Pardes, H. (1986) The clinician-researcher in psychiatry. American Journal of Psychiatry, 143, 968-975.

Campbell, M. (1987). Research (as a career) in child and adolescent psychiatry. Bulletin of the New York Academy of Medicine, 63(4), 357-362.

Chamberlain, J. (1988). Challenges for child psychiatric-mental health nursing. Journal of Child and Adolescent Psychiatric Mental Health Nursing, 1, 2.

Department of Health and Human Services. (1987, November). Alcohol and endrocrinological development in adolescents special announcement. Rockville, Maryland: Author.

Department of Health and Human Service. (1988, October). Research on the prevention of alcohol abuse among children, adolescents, and young adults program announcement. Rockville, Maryland: Author.

Graduate Medical Education National Advisory Committee. (1980). Summary report of the graduate medical education national advisory committee (Vol. 1, DHHS publication No. (HRA) 81-651). Washington, DC: Office of Graduate Medical Education, Health Resources Administration.

Green, M. (1983). Coming of age in general pediatrics. Pediatrics, 72, 275-282.

Haggerty, R. J. (1988). Behavioral pediatrics: A time for research. Pediatrics, 81, 179-185.

Haviland, M. G., Pincus, H. A., & Dial, T. H. (1987). Career, research involvement, and research fellowship plans of potential psychiatrists. Archives of General Psychiatry, 44, 493-496.

Haviland, M., Dial, T., & Pincus, H. (1988). Characteristics of senior medical students planning to subspecialize in child psychiatry. American Academy of Child and Adolescent Psychiatry, 27, 404-407.

Herring, K. L. (1987). American Psychological Association's guide to research support (3rd ed.). Washington, DC: American Psychological Association.

Hopps, J. G., & Pinderhughes, E. B. (1987). Profession of social work: Contemporary characteristics. In A. Minahan (Ed.), Encyclopedia of social work, (18th ed., Vol. 2, pp. 351-366). Silver Spring, MD: National Association of Social Workers.

Howard, A., Pion, G., Gottsredson, G., Flattau, P., Oskamp, S., Pfasflin, S., Bray, D., & Burstein, A. (1986). Changing face of American psychology: A report from the committee on employment and human resources. American Psychologist, 41, 1311-1327.

Institute of Medicine. (1985a). Personnel needs and training for biomedical and behavioral personnel. Washington, DC: National Academy Press.

Institute of Medicine. (1985b). Research on mental illness and addictive disorders: Progress and prospects. A report of the Board on Mental Health and Behavioral Medicine. American Journal

of Psychiatry, 142(7, Suppl.), 1-41.

Institute of Medicine. (1988). Resources for clinical investigation. Report of a study by a committee of the Institute of Medicine (Division of Health Sciences Policy), National Academy of Sciences. Washington, DC: National Academy Press.

Jones, L. B., Lindzey, G., & Coggeshall, P. (Eds.). (1982). An assessment of research-doctorate programs in the United States: Social and behavioral sciences. Washington, DC: National Academy of Sciences.

National Institute of Child Health and Human Development. (1988). Center for research for mothers and children: 1987 progress report (DHHS Publication No. 201-778:61234). Washington, DC: U.S. Government Printing Office.

National Institute of Mental Health. (1988a). A national plan for schizophrenia research. Report of the National Advisory Mental Health Council (DHHS Publication No. (ADM) 88-1571). Rockville, MD: U.S. Department of Health and Human Services.

National Institute of Mental Health. (1988b). Specialty mental health organizations: United States, 1985 (Mental Health Statistical Note No. 189). Rockville, MD: U.S. Department of Health and Human Services.

National Institutes on Drug Abuse. (1988). Moyer Report. Rockville, MD: Author.

National Research Council. (1988). The behavioral and social sciences: Achievements and opportunities. Washington, DC: National Academy Press.

Neinstein, L. S., & MacKenzie, R. G. (1989). Prior training and recommendations for future training of clinical research faculty members. Academy of Medicine, 64, 32-35.

Pion, G. (1988). Clinical and developmental psychology: A preliminary overview of human resources. Unpublished manuscript, American Psychological Association, Washington, DC.

Renz, L. (Ed.). (1986). The foundation directory (10th ed., Suppl.). New York: The Foundation Center.

Rosen, S. M., Fanshel, D., & Lutz, M. E. (Eds.). (1987). Face of the Nation, 1987. Silver Spring, MD: National Association of Social Workers.

Saxe, L., Cross, R., & Silverman, N. (1988). The gap between what we know and what we do. American Psychologist, 53(10), 800-807.

Stapp, J., Tucker, A., & VandenBos, G. (1985). Census of psychological personnel. American Psychologist, 42, 1317-1351.

Weissman, S. H., & Bashook, P. G. (1986). A view of the prospective child psychiatrist. American Journal of Psychiatry, 143, 722-727.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

The initial portion of this chapter summarizes the committee's response to its charge: to review the current state of knowledge in the child and adolescent mental disorders field and to identify areas of recent progress; to indicate areas of high research priority and promising opportunities for research in light of advances in related fields; and to consider the barriers to research on childhood mental disorders. In commissioning this report, the National Institute of Mental Health (NIMH) also requested guidance concerning a variety of program and policy objectives, including the role it should have in providing leadership and support to the field. NIMH did not ask the committee to prioritize the child mental health budget in relation to other areas of responsibility within the purview of NIMH.

The committee's proposal for a national plan to invigorate and sustain research in this area is delineated in the latter part of this chapter. As requested by NIMH, an estimate of the costs involved in carrying out these recommendations is provided.

PREVALENCE AND COSTS

Current Knowledge and Research Progress

A substantial number of children and adolescents in the United States suffer from seriously handicapping mental disorders. These disorders include developmental impairments that limit a child's ability to think or learn, to form social attachments, or to communicate effectively with others; a broad range of emotional disturbances involving depression, crippling states of anxiety, or both; behavioral problems characterized by disruptive and antisocial acts; and psychosomatic conditions in which a child's biological vulnerabilities are exquisitely sensitive to the child's mental state.

By the most conservative estimate, 12 percent of children under the age of 18 suffer from a mental disorder--more than 7.5 million youngsters in the United States alone. Recent studies have suggested that the range may be as high as 17 to 22 percent, or 11 to 14 million children and adolescents. Prevalence is substantially greater among poor and inner city children than in the population at large. Not all of these conditions are severely incapacitating, but each constitutes a burden on the child's ability to cope with the demands of school, family, and community life.

Each year in this nation about 49,000 children and youth are held in various public youth facilities, and many thousands more are in adult prisons. Millions of children are involved with child welfare, foster care, and residential treatment. Many of these children have a diagnosable mental disorder, but receive neither diagnosis nor treatment. Others who desperately need intervention also are falling through the cracks. Up to 25 percent of mentally retarded youngsters have behavioral and emotional difficulties that add to their handicaps and magnify their developmental difficulties. For persons with the dual diagnosis of retardation and a mental disorder, their mental illness often makes the difference between achieving relative autonomy in life or having to live within restrictive institutional settings.

Approximately 2.5 million children in this country received treatment in 1985 for a mental disorder, according to the Congressional Office of Technology Assessment. This means that at least another 5 million other children needed some type of intervention but did not receive any treatment. But even for those receiving treatment, benefits are not always marked or long-lasting, especially for those with the most severe and debilitating mental disorders. These facts argue for enhancing availability and accessibility of treatment for children; however, they also highlight the need for a better understanding of the causes and determinants of childhood mental disorders as a means of developing more effective treatments and preventive interventions for the millions of children who need mental health services.

The burden of illness associated with these disorders for the child, the family and society is difficult to quantify, largely because the information needed to calculate personal and social costs has not been collected. Moreover, even the direct costs for treating childhood mental disorders proved to be impossible for the committee to estimate with confidence. As detailed in Chapter 2, various approaches to approximating these costs were limited because available data are not arrayed in relevant age categories for either mental health care or general health care. Although the committee was able to obtain mental health care cost estimates for children 18 and under (16 percent of all pediatric health care costs) from a regional analysis of treatment costs done specifically for this study, and for children primarily under 15 years of age from a forthcoming national study, such estimates are unreliable for making definitive statements on the direct treatment costs of these disorders. It is not possible to generalize beyond the sample with the regional data, and the national estimates do not include most of the costs associated with treating 15- to 18-year-olds.

In addition to direct costs for professional treatment services and for placement in residential facilities and hospitals, a substantial portion of related direct costs of care are derived from the need for social services, special education and juvenile justice

institutions. Indirect costs to society also must be considered. These include lost productivity for persons who die as a result of a mental disorder or for those whose handicapping conditions extend into adulthood. Intangible costs are exemplified by the unremitting emotional toll on the parents and siblings of an autistic child who is unable to return their love and by the suffering of a family or community when an adolescent causes the death of another or commits suicide.

Research Needs and Opportunities

Basic questions concerning how many children and adolescents suffer from mental disorders, who is likely to be afflicted, how many are currently receiving mental health services, how they are being served, at what cost, and how many more need such services remain to be adequately addressed. Other important concerns for services research would be the actual and potential barriers to treatment faced by different segments of the population. Only sound empirical research can answer these questions. Epidemiological studies should be conducted at regular intervals so they can be used to guide the creation of mental health services and to shape social policy about needed services and their effectiveness.

Although prevalence studies may touch on areas germane to the delivery of mental health services, additional research is needed on the provision of mental health services in primary care facilities and by pediatricians, in institutional settings associated with social welfare and juvenile justice systems, and in public schools and other educational programs.

Epidemiological research requires some type of classification system as a guide, but it also can help refine the classification systems for childhood disorders and suggest new approaches to them. Many of the epidemiological surveys that have been conducted on child and adolescent mental health were focused on determining the prevalence of the specific disorders identified in current diagnostic systems. In the future, greater attention should be paid to determining the severity and extent of handicap associated with these disorders over time and across developmental epochs. Measures of both severity and prevalence are essential for understanding the true clinical magnitude of mental disorders.

Existing and planned regional surveys are a step toward a comprehensive, epidemiological study of the mental health of children and adolescents on a national scale. An important prerequisite for such studies is the development of valid and reliable diagnostic rating instruments to detect and classify mental disorders and to assess the range of impairment and periods of disability associated with each. Considerable progress has been made in this area, but more

work needs to be done before a national study is undertaken. Studies are also needed to determine how best to integrate findings about a child's competence to provide diagnostic information, and the difficulties that may arise when using a variety of other informants (e.g., parents, teachers, clinical interviewers) to derive a picture of the child as a whole person.

Although cross-sectional research has been the mainstay of clinical research in the past, greater emphasis on prospective longitudinal research is needed. In prospective longitudinal research, investigators can study children from the time of first contact through the course of their development in order to observe the pathways of development and the ways in which experience and treatment may alter the outcome for a particular child or group of children. Longitudinal studies are most fruitful in relation to children deemed to be at risk because of well-defined factors. With advances in genetic research, longitudinal studies will be useful in exploring the interactions between genetic endowment and environmental factors. Investigations of childhood mental disorders during specific periods of development are also needed using a modified longitudinal design that combines cross-sectional and longitudinal approaches. This innovative, short-term longitudinal design was developed by life-span psychologists and could be useful in identifying vulnerabilities during critical periods of development.

CAUSES AND DETERMINANTS

Current Knowledge and Research Progress

The pace of scientific advances in the developmental processes of childhood has quickened dramatically over the past two decades. Knowledge from animal and human studies has set the stage for a more profound understanding of developmental abnormalities and how best to prevent them or to ameliorate their consequences. One important source of information on the causes and determinants of childhood mental disorders comes from the study of factors known to place some children and adolescents at high risk for the development of these disorders. Scientific evidence has implicated a variety of biological, psychological, social, and environmental factors, including:

- genetic factors that increase a child's vulnerability to affective and anxiety disorders, Tourette's disorder, autism, and attentional and learning disabilities;

- biological insults such as physical trauma or exposure to toxic chemicals or drugs;

- poor prenatal care which leads to increased risk of prematurity and a host of attendant problems;
- chronic physical illness such as leukemia, diabetes mellitus, asthma, cystic fibrosis, epilepsy, and AIDS;
- cognitive impairments such as those resulting from mental retardation and deficits in sensory perception, including deafness and blindness;
- persistent psychosocial adversity such as poverty, disorganized and inadequate schools, and homelessness;
- abuse or neglect;
- disturbed family relationships; and
- parental mental illness, with the potentially dangerous combination of psychologically traumatic disruptions of family life and inconsistent parenting.

At present, the causal relationships between risk factors and mental disorders are not well understood. Too often, the same child bears several associated risk factors, as when a child is slow in development or retarded, is exposed to high levels of lead in the environment, and experiences parental neglect; or when a child is born to a mentally ill or drug-addicted mother and then enters a series of foster homes. The presence of multiple risk factors complicates efforts to ameliorate the situation, as well as to understand the means by which each factor increases risk.

Direct observation of infants--including those in need of clinical intervention--has revealed identifiable patterns of interaction underlying attachment and socialization. Studies of primate behavior have suggested which mechanisms in the brain are involved in the regulation of emotions and anxiety. Experiments with preschool and school-age children have helped define determinants of social behavior and self-esteem, as well as modifiers of aggression and assertiveness. Biological and behavioral studies of deaf, language-delayed, and normal children have provided new insights into the workings of the brain and stages of language acquisition. From such work, the picture of the competent infant and child and of effective interactions between parent and child has been refashioned and refined, and a better understanding of the biological and environmental preconditions needed for normal development is emerging.

Research Needs and Opportunities

Systematic research on the causes and determinants of mental disorders of childhood and adolescence can be expected to lead to

advances in treatment and prevention. Given the diversity of disorders involved, this is an enormous endeavor. Priority for research, therefore, should be given both to those disorders with the greatest burden of suffering and to those with the highest prevalence. This list would include certain neuropsychiatric disorders such as autism and Tourette's disorder; attention-deficit hyperactivity disorder; depressive and anxiety disorders; and conduct disorders, particularly those characterized by violent, antisocial acts.

Success will depend on knowledge gained in many areas, using the theoretical orientations of a number of disciplines. Theories are essential to research, providing a conceptual framework or model for ideas and empirical observations. They must be sufficiently precise to suggest testable questions for future research, yet flexible enough to accommodate new concepts and findings. At present, only vague outlines of models exist for most mental disorders. One current challenge is how best to conceptualize the interplay between a biological vulnerability to a mental disorder and specific psychological and social circumstances, bearing in mind the constant changes that occur during development.

Intertwined with the need for theory development is the need for basic research on the biological, psychological, and social substrates of human behavior. From such studies will arise new concepts and techniques that are likely to transform our understanding of and approach to the most severe mental conditions of childhood and adolescence. This information constitutes the building blocks essential for forming more sophisticated theories. Several examples of future research opportunities are described below.

Study of the genetic and neurochemical mechanisms regulating the growth and development of the brain will provide clinical researchers with fundamental insights into the unfolding, functioning, and repair of the central nervous system--processes that may go awry in developmental disorders. The study of the human genome will facilitate detection of the genetic aspects of any well-defined, genetically transmitted human disorder. Recombinant DNA techniques and study of regulatory mechanisms will provide some of the tools to study the steps between genetic vulnerability to a disorder and the eventual appearance of that disorder in a given individual. The discovery of biological contributions to disorders may usher in a new era of diagnosis and treatment or prevention of some childhood mental disorders.

Developmental neurosciences explore the neurobiological organization of the developing brain and its interaction with the environment. Information gleaned from these sciences may bring about a greater understanding of the mental impairments that are part of many disorders, including specific and pervasive developmental

disorders, mental retardation, attention-deficit hyperactivity disorder, and affective and anxiety syndromes in which brain function is impaired. Technological advances in these sciences are astonishing and heartening. Neurochemical and neuroanatomical techniques will enable investigators to carry out more precise neuropathological studies. In anticipation of these developments, vitally important post-mortem "brain banks" have been established for several neuropsychiatric disorders of childhood, including autism and Tourette's disorder. Noninvasive techniques for observing brain structure and function, including magnetic resonance imaging (MRI) and spectroscopy (MRS), computer-analyzed EEG, positron emission tomography (PET), and single photon emission tomography (SPET), promise a new era of clinical studies of brain maturation linking function to behavior.

Considerable research is needed to characterize the natural histories of the mental, behavioral, and developmental disorders of children and adolescents. Such studies have immediate clinical relevance, because they focus on the development of valid and reliable assessment techniques, cross-sectional and longitudinal studies of course and outcome, and treatment and intervention. Priority should be given to the development of assessment instruments that measure key areas of competence and disability, including cognitive processing, intelligence, and problem-solving ability; communicative and social skills; motivation; capacity for resilience; adaptive function; social and environmental factors; family interactional factors; and community resources and their utilization. Also needed are methods of tracking the severity and course of each disorder over time and across developmental epochs. Assessment batteries must, as appropriate, incorporate advances in biological and physiological measures. Advances in genetics and the neurosciences should soon open new avenues for identifying and monitoring childhood mental disorders. Recent neuroanatomical, neurophysiological, neurochemical, and neuroendocrine studies show considerable promise.

INTERVENTIONS

Current Knowledge and Research Progress

Because of the diversity of mental disorders and possible approaches to them, clinicians have developed a variety of cognitive, educational, behavioral, psychotherapeutic, and psychopharmacological treatments. These treatments are offered in various settings, depending on the severity of the condition and the availability of resources: outpatient clinics; offices of professionals; agencies; hospitals; residential treatment centers; special schools; and programs within the mainstream of public education. Often, a child and family require a combination of interventions, for example, behavioral and psychological therapies, family therapy, special education, and medication.

The fact that a range of treatments may be available for any given condition raises important questions about which treatment is most effective, for which child and family, at what point of development. These remain primarily questions for future research. A growing body of evidence supports the effectiveness of many treatments used in clinical care. In general, conventional treatments are demonstrably better than no treatment. For too many severe disorders, however, available treatments are merely palliative or even ineffective. Increased understanding of the causes and determinants of these mental disorders will be the key to discovering more specific and effective treatments.

Early identification is now more feasible than ever before in determining precursors to clinical dysfunction. In addition, early identification of children at risk is now possible over a broader range of mental disorders. Recent developments such as clearer delineation of types of clinical dysfunctions and more specific and sensitive assessment techniques will allow for greater precision in evaluating the outcome of prevention trials in the future.

However, many questions remain in relation to the promise of preventive interventions for mental disorders. Preventive interventions require a protracted period of evaluation to ensure that the dysfunction is prevented, making such research inherently longitudinal. The long-term evaluation of impact is especially critical, because the magnitude and scope of intervention effects can greatly increase over time. Classic examples of successful intervention programs include the 1960s educational enrichment programs for socially disadvantaged infants and preschool children. These programs have provided evidence that interventions can not only increase success at school but can also lead to lower arrest rates, less school dropout, and lower rates of early pregnancy in adolescence. Other unanticipated gains from these programs include greater maternal employment and enhanced parental child rearing competence. Although they were not designed to measure mental disorder as an outcome, these effective preventive efforts provide valuable clues to help guide further research on early interventions deliberately designed to modify risk factors known to be associated with various types of mental disorders in children and adolescents.

Other intervention programs have been organized for children at high risk for developmental and mental illness because of prematurity, medical illnesses such as asthma and diabetes, parental mental illness, and acute stress. Increased understanding of the causes of various mental disorders--along with better evaluation methods and a commitment to longitudinal studies--will allow for more refined targeting of preventive interventions. Conceptual advances in developmental, social, and cognitive psychology, and the integrative orientation provided by developmental psychopathology will shape the early intervention programs of the future.

Research Needs and Opportunities

A number of treatment approaches now in widespread clinical use are effective, but it often is difficult to predict accurately which children will show the greatest benefit in response to which treatments. Recent advances in research methodology make possible sophisticated evaluations of specific components of treatments. In the future, such evaluations will result in better "matching" of patient and treatment.

Several types of research into the efficacy and safety of treatments have a high priority, including:

- small-scale studies of the outcome of treatments with different, well-defined clinical groups;
- medication trials that evaluate different types of outcome, sustained effectiveness, and emergent side effects;
- sophisticated studies of the effectiveness of combinations of treatments; and
- intensive exploration of group, school, and community interventions for the many children and adolescents in need of services.

Another high priority is the study of children with multiple problems who are cared for in residential settings, hospitals, and outpatient clinics. Although these traditional care settings do not easily allow for some of the fine points of research design, such as randomizing children to different treatments, they will allow investigators to see how treatments work in the actual settings in which they are used.

The ultimate goal of research on the causes and treatment of mental disorders is to develop effective means of prevention. As knowledge concerning causes and determinants of disorder increases, more focused and efficient preventive interventions should emerge. There is general consensus that even where preventive efforts cannot eradicate the problems of mental illness in childhood, effective intervention programs may reduce some of the deleterious consequences. Thus, research should be aimed at identifying children at especially high risk for specific disorders and then providing interventions aimed at helping them negotiate crises more effectively. However, based on past experiences, the longitudinal studies that will need to be supported for this type of research should include a broad assessment of outcomes, in order to detect unanticipated effects in areas beyond the presence or absence of a few key mental disorders.

OVERCOMING BARRIERS TO RESEARCH PROGRESS

Both intrinsic and extrinsic barriers create challenges for mental health research on children and adolescents. Intrinsic obstacles arise from the complex nature of normal human development and the ethical and pragmatic issues raised by research with infants and children. These barriers cannot be eliminated; rather, investigators must devise ways of coping with them more effectively. Extrinsic limitations include the shortage of trained investigators, the paucity of institutional settings committed to systematic research on child mental health, and the lack of sustained funding for investigators to pursue rigorous research over many years. The committee believes that these extrinsic limitations can and should be overcome through the mobilization of new resources.

Distressingly few academic centers or medical schools include a research focus on child mental disorders. The committee believes that this lack of attention to a critically important area no longer is acceptable, given the combination of need and opportunity for progress that exist. Efforts are needed to create viable, stable career pathways for talented individuals who are interested in studying child mental disorders. Such arrangements are possible only with the willing participation of academic institutions that support research, and officials at such institutions will have to be educated not only about the needs for this type of research but also about the high potential for progress.

In an effort to attract talented young individuals into child mental health research, interested individuals from many disciplines within the field need to accept the responsibility of educating colleagues and students alike about the burden of child mental disorders and the many promising avenues of inquiry that are emerging. It is especially important to target students early in their training, both at the undergraduate and graduate levels, for such programs. For interested faculty who are based in graduate training programs or in medical schools, participation on admissions committees and active involvement in teaching and curriculum development are additional ways of identifying and recruiting future researchers.

In clinical training programs, research training must be enriched, at least at some key sites. More doctoral programs are needed in psychology and social work that explicitly emphasize this patient population. Research training opportunities also need to be expanded in allied disciplines such as nursing and education. Within medicine, research training on child mental disorders should be readily available to child psychiatrists and pediatricians. Also, M.D.-Ph.D. programs could train a small group of talented individuals with both medical and research expertise in clinical or basic areas relevant to child mental disorders. To the extent that research opportunities

compete with clinical training, it may be necessary to reassess how current programs allocate training time.

The committee believes that these and other desirable changes can occur in child mental health research, given adequate incentives and financial support. The NIMH is the most logical and appropriate source for the bulk of such support, and the remaining recommendations in this report reflect its central role. Still, the committee is quite aware of the critically important resources that individuals, private foundations, and academic institutions can provide. Such contributions undoubtedly will remain essential for promoting especially innovative programs. Support from various resources are needed so that the child mental health community can fulfill its responsibility for creating a vigorous and diverse research focus on childhood mental disorders.

A NATIONAL PLAN FOR NIMH-SPONSORED CHILD AND ADOLESCENT MENTAL DISORDERS RESEARCH

As stated earlier in this report, there are several federal agencies involved with the emotional and/or developmental difficulties of children including: the Office of Children, Youth, and Families; Maternal and Child Health; the Justice Department; the National Institute of Child Health and Human Development (NICHD); the National Institute of Neurological Disorders and Stroke (NINDS); the National Institute on Drug Abuse (NIDA); and the National Institute of Alcoholism and Alcohol Abuse (NIAAA). However, the main focus of these agencies is not the promotion of research on mental disorders. The federal agency primarily responsible for mental health issues for the nation is the National Institute of Mental Health. Therefore, the NIMH should assume the leadership role in the development, formulation and implementation of a comprehensive national plan for research in child and adolescent mental disorders.

The national plan recommended by the committee focuses on three interrelated areas: the need to develop viable and attractive individual careers in child mental health research; the need to encourage and support programmatic research at the frontiers of scientific inquiry; and the need to enhance NIMH's ability to provide sustained leadership in this area.

This plan is intended to be capacity-building in nature and should set the stage for a major expansion of this field of scientific inquiry. Specifically:

- NIMH should provide support and incentives at each stage of career development, including research training and career stability for an expanded pool of research scientists.

- o NIMH should increase support for individual project, program project, and center grants.

- o NIMH should increase funding for research in the areas of epidemiology; assessment, diagnosis, and treatment; prevention and special populations; services and systems of care; basic behavioral and social sciences; neurosciences; and the NIMH intramural research program.

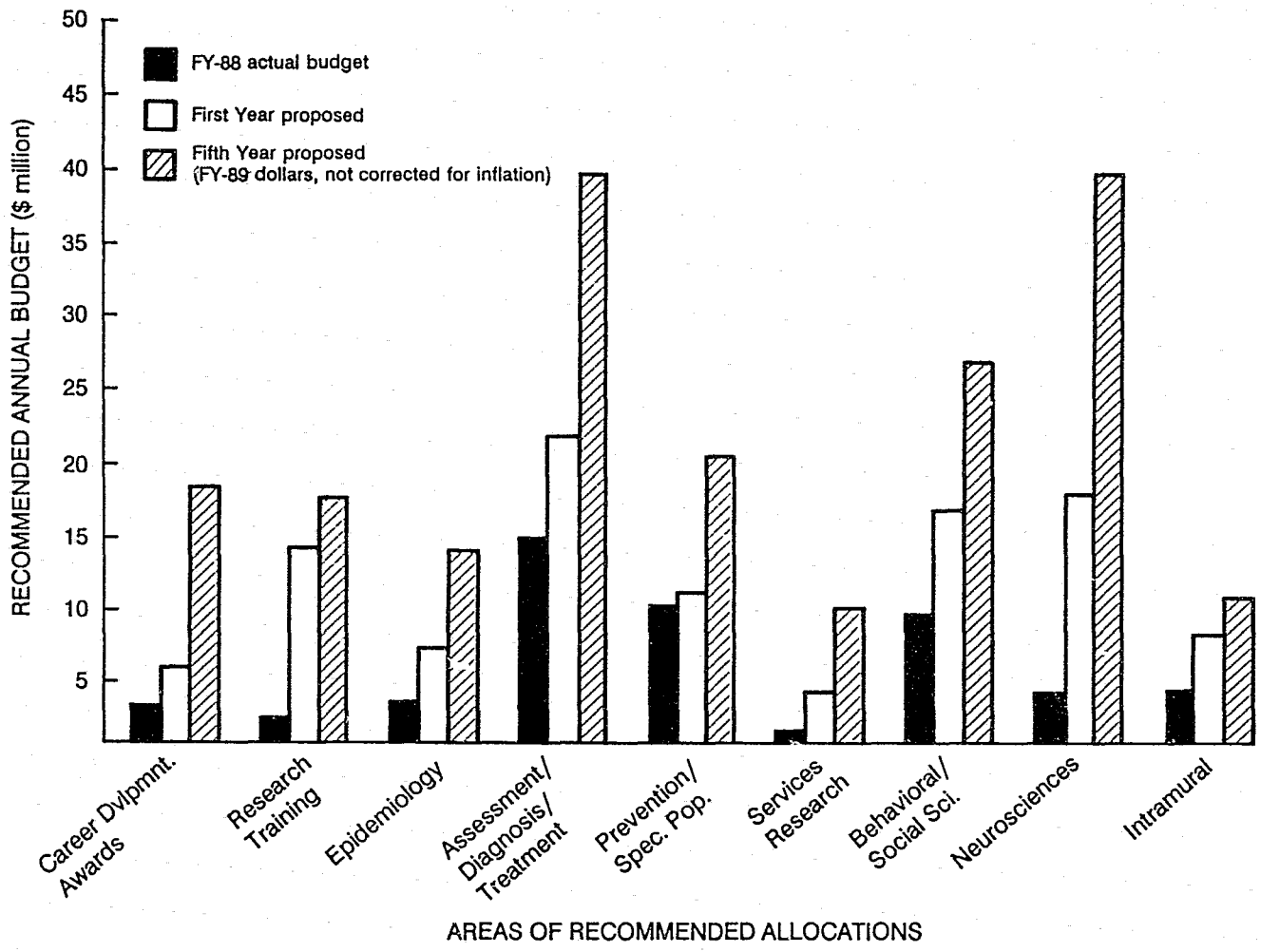
- o NIMH should establish an institute-wide consortium concerned with child and adolescent mental health research to implement this national plan.

The committee proposes a phasing in of expenditures, after an initial surge of increased support to meet the most pressing needs within the field (see Figure 6-1). The emphasis in the first year would be on taking advantage of missed research opportunities in the child mental health field due to lack of funding, building the necessary infrastructure for growth, and supporting research training and career development to ensure a cadre of researchers in the future. In the subsequent four years, funding increments would be less dramatic. The heavy allocation of resources in the first year is an investment that will enable the field to use the incremental growth in the outlying years.

The committee believes that these budget recommendations are a reasoned response to the needs and research opportunities within the field of child and adolescent mental health. Proposed allocations for each area represent the consensus views of the committee; these were based on information provided by researchers across the entire field and on data from NIMH about the extent of the shortfall of resources available in each area to fund worthy proposals. The committee recommends that this funding be <u>added</u> to other growth in the NIMH budget since the committee supports the conclusion of an earlier report (IOM, 1984) that overall funding for mental health research remains low. Moreover, other parts of the mental health field certainly would benefit from progress in many of the areas of research opportunity identified in this report.

Career Development and Research Training	First Year: $20 million Fifth Year: $35.5 million

Future progress in research is dependent on the recruitment, training, and retention of gifted scientists across a range of disciplines. In the judgment of the committee, the most pressing need is for support of well-trained and highly motivated scientists during the first decade of their research careers. Attrition at this stage is the most costly, and it is commonplace. The key ingredients for success, apart from the motivation and capability of the individual,


FY-88 actual budget
First Year proposed
Fifth Year proposed
(FY-89 dollars, not corrected for inflation)
RECOMMENDED ANNUAL BUDGET ($ million)
50
45
40
35
30
25
20
15
10
5
Career Dvlpmnt. Awards
Research Training
Epidemiology
Assessment/ Diagnosis/ Treatment
Prevention/ Spec. Pop.
Services Research
Behavioral/ Social Sci.
Neurosciences
Intramural
AREAS OF RECOMMENDED ALLOCATIONS

are having sufficient time to develop an independent line of investigation and having access to necessary research resources, including colleagues from related fields.

NIMH already has several excellent programs for fostering early experiences in research and promoting continued excellence, but these programs are seriously underfunded, both in terms of maximum salary for individual investigators and in terms of total funding. One of the strengths of these programs is their requirement that investigators be guaranteed substantial amounts of protected time for research. Such protection seems especially critical for young researchers faced with conflicting demands on their time. Unfortunately, these grants often do not adequately cover the investigator's salary. The committee heard repeatedly from researchers throughout the country and across all disciplines that the current ceilings on stipends create serious problems. Some universities have begun to discourage their young faculty members from seeking these NIMH grants, because they lack other funds to compensate for the unrealistically low salaries. The committee recommends that existing scientist development awards be increased so that salaries for investigators are no less than 80 percent of the customary salaries of beginning and middle-level faculty.

Although NIMH recently has reorganized its career development awards and has changed the names of specific awards, the intent remains the same--to provide a meaningful research career pathway for talented investigators in many fields. Explicit funding for researchers in child and adolescent mental health is essential. The NIMH currently supports 15 such investigators through these awards, at a cost of $0.9 million. The committee believes the number of grantees should be doubled immediately. At an average cost of $100,000 per grant, the first-year budget would be $3 million. The committee recommends that at least 15 awards be added each year, for a Year 5 total of 90 investigators at $9 million.

Based on its survey of research training programs and of many individuals just entering the field of child and adolescent mental health, the committee believes that a first-year offering of 20 First Independent Research Support and Transition (FIRST) awards would be a reasonable allocation of funds. Alternatively, 10 FIRST awards and 10 Clinical and Adolescent Mental Health Academic Awards could be made in the first year. Ten new awards could be added in each of the next four years, making a total of 60 awards nationally by Year 5. Thus, Year 1 costs would be $2 million, increasing to $6 million by Year 5.

Also vital for new investigators are "small grants". For many persons, they represent the first step in a research career. Fortunately, these grants have just been increased to permit funding of $50,000 per year for two years, to support new approaches and the testing of promising hypotheses. The committee recommends a

first-year allocation of $1 million to support 20 small grants, with increments of 10 new grants for each of the next four years. By Year 5, this program should be supporting 60 small grants at a total cost of $3 million, covering all fields.

Expanded opportunities for research training are necessary in all the disciplines involved in the study of child and adolescent mental disorders. Training should be facilitated in child psychiatry, pediatrics, developmental and clinical psychology, developmental neuroscience, nursing, social work, and other basic behavioral and social sciences. This can be done in a variety of ways, including undergraduate summer research, pre- and postdoctoral programs, M.D.-Ph.D. training programs, and special training opportunities for members of minority groups.

In some disciplines, the most efficient mechanisms will be institutional grants for research training programs; in others, individual grants could enable a trainee to focus on child mental disorders while pursuing a more general training program in neuroscience, epidemiology, or some other relevant discipline. Some training programs may appropriately be incorporated into research centers. Careful assessment is needed of training support mechanisms. Stipends should realistically reflect years of training and competing career pathways. The committee urges that child mental health research be declared a critical-shortage area, similar to AIDS research, so that trainees who go into child research can have all or part of their educational loans forgiven. In addition, institutional research training grants and center grants must provide for real costs to the programs of teaching and other forms of monitoring.

There should be increased funding for research training programs in core disciplines. Current NIMH expenditures for research training related to children and adolescents is $1.5 million. The committee proposes that $12 million be allocated for 25 to 30 institutional training grants related to child and adolescent mental health. Each program would be expected to have 6 to 10 trainees in a center that has a critical mass of scholars from whom they could learn. There would be considerable competition for such institutional awards, particularly if the stipends were increased and more funding for research mentors were provided. The committee estimates the average annual expense for each training program to be $425,000. This figure is based on eight stipends at an average of $35,000 each, $75,000 for a small portion of mentors' salaries and trainee expenses, and the remainder for indirect costs. Stipends are low estimates of what they probably need to be, when adjusted appropriately. Where appropriate and possible, programs should explicitly encourage an amalgamation of clinical experiences and research training.

The committee proposes that $1.5 million be spent on individual fellowships, independent of training grants; this would provide 50

fellowships at an average total cost of $30,000 each in the first year. The costs for pre- and postdoctoral trainees are approximately the same; although the predoctoral stipends are lower, their tuition costs even out the total expense. The committee recommends that an incremental 25 trainees be added in each of the next two years, so that the total program would provide 100 new fellowships a year, at a cost of $3 million. Given the diversity of disciplines relevant to child and adolescent mental health, many nascent researchers may want and need specialized research training, but they are enrolled in programs that do not offer it. These NIMH research fellowships would allow such individuals to obtain training from the most appropriate mentors, wherever they may be. Again, amounts allocated for this program would need to be increased when stipends are adjusted, as recommended earlier.

The failure to support a significant number of M.D.-Ph.D. students within the field of mental health generally has been, in this committee's view, a serious error--one that is just now being rectified by NIMH. The committee proposes that students be allowed to apply to enter an M.D.-Ph.D. track with an emphasis on child mental health in their first year of medical school. At least 15 to 20 new positions each year should be available explicitly for research disciplines closely aligned to child and adolescent mental disorders. Thus, by the end of five years, a minimum of 60 trainees could be enrolled in the program. First-year costs for this program would be about $0.5 million, increasing by that amount each year for five years. An informal survey by the committee of major child psychiatry programs across the country indicates that this program would meet only a fraction of the existing demand for such training; openings could be filled immediately by highly qualified trainees.

NIMH should also consider establishing a program for senior scientists that would include an explicit research training function. Over the past decade, the Hazen Foundation award has become highly respected for its recognition of academicians in all disciplines who have combined excellent research with outstanding training. The award is unusual in giving both a direct prize to the investigator and funds to the institution; the latter are earmarked for support of trainees working with the investigator. A similar NIMH mechanism could provide unique opportunities for especially talented trainees to work with the best researchers in child and adolescent mental health across the country, while also supporting and recognizing an invaluable resource within the field.

In order to achieve growth in this field, the pool of potential trainees must be expanded. Attracting more talented students is not simply a matter of money. Means must be found to acquaint a broader audience of students with the importance of child and adolescent mental disorders, the burden of illness they impose, the urgent need for progress, and the exciting potential for scientific advances,

particularly at the interface between disciplines. The committee recommends that NIMH target two points in an individual's career: the final two years of undergraduate education, when decisions are being made to enter graduate or professional programs; and the completion of graduate or professional training, when decisions are being made to enter specialized postdoctoral programs. Specific recommendations include the establishment of NIMH-sponsored scientific retreats or summer institutes in which prospective students or postdoctoral fellows would be able to interact with leading researchers in the field and to learn about exciting research opportunities and the funding of longer-term research opportunities for individuals in professional training.

The committee also urges the creation of NIMH-sponsored summer courses for research faculty. These could be modeled on the Gordon Conferences sponsored by the American Association for the Advancement of Science or the courses in genetics and neuroscience offered at Cold Spring Harbor Laboratory and the Jackson Laboratory in Bar Harbor. These are ideal settings for developing new ideas and initiating collaborative ventures based on the latest research findings.

A major effort is needed to recruit more researchers from minority groups. Efforts to diminish the suffering caused by many of the disorders of children and adolescents will depend on the development of treatment and prevention programs that are sensitive to cultural diversity and that address perceived community needs. This can often be facilitated by the recruitment of minority researchers.

Support for Individual Project, Program Project, and Center Grants: Recommended Budgets for NIMH Research Areas

As the preceding chapters document, areas of research in the field of child and adolescent mental health deserve substantial and sustained support. Existing funding mechanisms include individual project grants, program project grants, multisite collaborative studies, and research center awards. The committee reviewed each of these mechanisms in considering how best to fund priority areas of research.

Individual project grants need to be expanded in order to sustain and fully utilize the nation's existing research capacity. For most areas of research within NIMH's purview, available funding for individual project grants has been insufficient to take full advantage of the nation's current research capacity. This conclusion is supported by the large number of high-quality research applications received by the institute over the past several years that have not been funded because of lack of resources. Many of these proposed projects address priority areas of research in child and adolescent mental disorders.

In the judgment of the committee, program project grants and research center awards are also needed to move research ahead rapidly. A talented group of investigators committed to a specific area can act synergistically and maintain a high level of scientific productivity. This lesson is illustrated well by the success of such centers of excellence as the intramural research programs at the NIH, and the extramural Mental Retardation Centers sponsored by the National Institute of Child Health and Human Development (NICHD) and the Mental Health Clinical Research Centers sponsored by NIMH. In the child mental health field, such centers would provide important sites for research training, offer pathways for career development, and create unique opportunities for interdisciplinary research. Support for bed costs must be included for those centers involved in hospital-based research.

At present a critical mass of investigators exists in only a handful of child and adolescent mental disorder research programs. For example, ten universities and medical centers account for 64 percent of the research portfolio of the Child and Adolescent Disorders Research Branch of NIMH. These same programs account for a disproportionate share of the research reports in the field.

Some specific scientific domains that could benefit immediately from the creation of clinical research centers include:

- research on the etiology, evaluation, and treatment of particular disorders or classes of disorder, such as autism, conduct disorder, affective disorders or tic disorders;
- longitudinal research focused on the mechanisms that underlie specific risk and protective factors or on certain catastrophic outcomes such as suicide or homicide;
- research on the development of valid and reliable assessment instruments for use in epidemiological or clinical studies;
- efforts to develop safe and reproducible approaches to treatment; and
- intensive exploration of group-, school-, and community-based interventions.

Research centers in the basic, behavioral, and social sciences that are engaged in programmatic research germane to child and adolescent mental disorders should also be supported.

The committee recommends that NIMH foster the development of informal research colloquia to be convened on a regular basis to review scientific progress in several areas, including:

- epidemiology, to review progress in the assessment of children and adolescents using standardized techniques suitable for large-scale multisite studies;

- treatment research, to review evidence concerning the potential value of combined treatments for specific disorders;

- prevention research, to review progress in defining the mechanisms associated with specific risk and protective factors and to consider small- and large-scale collaborative early intervention studies; and

- basic biological and psychosocial research, to review progress on fundamental research mechanisms relevant to mental disorders and to consider new assessment techniques that might be useful in clinical research on these disorders.

There is abundant evidence that many investigators would apply themselves to new areas of research if funding were available. For example, when the National Institute on Drug Abuse (NIDA) recently announced potential increases in funding, it received 838 grant applications; several hundred of them were highly deserving, but only 129 could actually be funded. This important point is sometimes missed. There are more than 15,000 neuroscientists and 22,000 research psychologists in the United States, to mention but two specialty areas germane to mental disorders of children and adolescents. Many of them could be drawn into the field, if research funding were available.

Stability of funding has been a chronic concern over the past decade, with the typical grant now being funded for three years or less. The committee recommends strongly that, where possible, grants be funded for five years. The committee anticipates intense competition for the new funds proposed for this initiative. Such competition should have an extremely salutary effect on research.

The recommended budget for research programs related to child and adolescent mental disorders at NIMH is presented in this section. Table 6-1 provides a detailed summary of the committee's estimated costs for its recommended five-year national plan for research on childhood mental disorders. In response to a request to describe the level of resources necessary to mobilize a national research initiative in this area, the committee offers the following proposals for allocation of funds. The details of the proposed budget should be considered illustrative rather than definitive. Obviously, unforeseen research opportunities may arise, necessitating substantial revisions of how these funds are apportioned. A brief description of the types of research to be supported and suggested dollar amounts for the first and fifth years are provided for each program area. These figures include current expenditures as well as proposed additions that could

TABLE 6-1: Recommended NIMH Budget for the National Plan for Child and Adolescent Mental Disorders Research

Program	Current (millions)	First Year (millions)	Fifth Year (millions)
Career Development Awards	$ 2.7	$ 6.0	$ 18.0
Individual Awards	$ .9	$ 3.0	$ 9.0
FIRST Awards	$ .8	$ 2.0	$ 6.0
Small Grant awards	$ 1.0	$ 1.0	$ 3.0
Research Training	$ 2.1	$ 14.0	$ 17.5
Institutional Training Grants	$ 1.5	$ 12.0	$ 12.0
Individual Fellowships	$ .6	$ 1.5	$ 3.0
Support of M.D./Ph.D. Students	--	$ .5	$ 2.5
Research on Epidemiology	$ 3.2	$ 7.5	$ 14.0
Research Grants	3.2	$ 4.5	$ 6.5
Research Centers	--	$ 2.0	$ 4.0
Prevalence Studies	--	$ 1.0	$ 3.5
Research on Assessment, Diagnosis and Treatment	$ 15.0	$ 22.0	$ 40.0
Research Grants	$ 15.0	$ 19.0	$ 31.0
Research Centers/Program Projects	--	$ 3.0	$ 9.0
Research on Prevention and Special Populations	$ 9.4	$ 13.0	$ 20.5
Prevention Research	$ 5.5	$ 6.0	$ 8.0
Minority Research and Research Center	$ .8	$ 2.5	$ 6.0
Antisocial and Violent Behavior	$ 3.1	$ 4.5	$ 6.5
Research on Services and Systems of Care	$ 1.0	$ 4.0	$ 10.0
Research Grants	1.0	$ 3.0	$ 6.5
Centers for Services Research	--	$ 1.0	$ 3.5

TABLE 6-1: Recommended NIMH Budget for the National Plan for Child and Adolescent Mental Disorders Research (Continued)

Program	Current (millions)	First Year (millions)	Fifth Year (millions)
Research on Behavioral and Social Sciences	$ 10.0	$ 17.0	$ 27.0
Research Grants	$ 10.0	$ 14.0	$ 22.0
Program/Center Projects	$ --	$ 2.0	$ 4.0
Infrastructure	$ --	$ 1.0	$ 1.0
Research on Neurosciences	$ 4.3	$ 18.0	$ 40.0
Research	$ 4.3	$ 8.0	$ 16.0
Infrastructure	--	$ 2.0	$ 2.0
Neurobiology Program/Center Grant	--	$ 2.0	$ 6.0
Centers for Neuroscience and Mental Disorders	--	$ 4.0	$ 10.0
Imaging Programs	--	$ 2.0	$ 6.0
NIMH Intramural Program	$ 4.5	$ 8.5	$ 10.5
Enhancement of Current Programs	$ 4.5	$ 5.0	$ 7.0
Additional Clinical Research Unit	--	$ 2.0	$ 2.0
Developmental Molecular Neurobiology Laboratory	--	$ 1.5	$ 1.5
NIMH Institute-Wide Consortium	--	$ 1.0	$ 1.0
TOTAL:	$ 52.2	$111.0	$198.5

be used immediately or very quickly. As is the convention, the recommended amounts include both direct and indirect costs. Furthermore, all recommendations are expressed in 1989 dollars; recommended budgets for future years will need to be corrected for inflation.

Epidemiology

First Year: $7.5 million
Fifth Year: $14.0 million

Progress has been rapid in recent years in the development and testing of the assessment techniques and survey instruments that are so critical to epidemiological research. Further progress in the near future should be fostered so as to permit substantial growth in

knowledge of the prevalence, natural history, and course (treated and untreated) of mental disorders.

Currently, the annual NIMH budget for epidemiology of child and adolescent mental disorders is $3.2 million, and competition within this area is so intense that many investigators do not even apply. Longitudinal elements in epidemiological studies are especially difficult to fund, partly because of their expense. A prompt increase in research funding in this area would bring the budget to $4.5 million the first year, with an increase of $0.5 million per year in subsequent years. By Year 5, costs for these types of research would reach $6.5 million annually.

The establishment of research centers in epidemiology focusing specifically on issues related to the scope and magnitude of mental disorders in children and adolescents would be an important strategy to advance knowledge and training from a public health perspective. The committee proposes that two centers should be funded the first year at a cost of $1 million each, increasing to four centers by the fifth year for a total cost of $4 million.

Prevalence studies, conducted in several locations, would yield information on the frequency of specific disorders in the general population, and lay the groundwork for a future large-scale survey. Such studies can make valuable contributions to advancing the classification of child and adolescent mental disorders and to delineating the risk factors associated with various types of disorders. Another important objective of prevalence studies is to provide a basis for estimating the mental health service needs of population groups and to examine problems associated with access and utilization. A multisite epidemiological survey of adult mental disorders in the early 1980s provided invaluable information on all of these issues for individuals above age 18.

As outlined in Chapter 2, prior to the beginning of a national, coordinated, multisite study of child and adolescent mental disorders, careful preparation is needed to develop the methods and procedures to be used. Much of this planning would take place within the proposed centers. A relatively large budget will be required for such a study. The cost of the multisite study of adult mental disorders was $20 million. If such a study were undertaken for children, the costs would be appreciably higher for many reasons. For example, the fact that parental mental disorder is a prime risk factor for children underscores the need for doing prevalence studies on families, not just on the individual child. The balance of the proposed budget would be targeted for preparation and implementation of prevalence studies.

Assessment, Diagnosis, and Treatment	First Year: $22 million Fifth Year: $40 million

Although the bulk of research within these areas should be applied and clinical, basic investigations that are likely to affect future treatment and diagnosis should also be included. NIMH currently has three foci in these areas: affective and anxiety disorders in childhood; autism and disruptive behavior; and special child populations (including mentally retarded children with emotional or behavioral problems, Tourette's disorder, learning disorders, and personality disorders). The budget, administered through the Child and Adolescent Disorders Research Branch, is $15 million. The funds are spent almost entirely on research grants, including two program project grants and one-half of a Mental Health Clinical Research Center.

The committee proposes an increase over the inflation rate of $4 million for the first year and $3 million thereafter for research grants. The first-year increase would fund approximately 20 new grants. The proposed increase is moderate in view of the 50 percent increase in the number of applications received by NIMH in the child and adolescent field within the past two years. Year 1 costs would be $19 million, increasing to $31 million by Year 5.

Centers facilitate interdisciplinary research and would be particularly valuable in the study of mental disorders of children and adolescents. The committee estimates that two centers could be added in the first year and that one additional center could be added each subsequent year, for a total of six centers nationally in Year 5. The centers would cost approximately $1.5 million per year each. Alternatively, these funds could be used to support program project grants that are smaller than center grants but could enable investigators to attack a particular problem from several different perspectives.

Prevention and Special Populations — First Year: $13 million; Fifth Year: $20.5 million

The broad area of prevention encompasses clinical prevention of severe disorders, study of prevention strategies, and research on factors that put children at risk for mental disorders. It concerns itself with infants, toddlers, and school-age children. Such research is especially in need of the longitudinal perspective, which requires stable funding over several years. These studies often require creative collaborations between academic centers and other settings, such as schools or detention centers. The current budget for this area is $5.5 million, which NIMH deems sufficient to fund all approved applications. Nevertheless, the committee recommends a first-year budget for prevention research of $6.0 million, increasing by $0.5 million per year, to a Year 5 total of $8.0 million. Work in this area should be stimulated because, in the long-term, such research is crucial for the field; amounts allocated to it should be reassessed

regularly as advances in other areas create new opportunities for preventive strategies.

Although problems of minorities are included in several of the categories described in this report, research that focuses specifically on this area is needed. Of particular interest is research dealing with the validity of various behavioral tests and assessment instruments for minority groups. There is now one center dealing with minority adolescents, at a cost of $812,000. The committee proposes that a second be added with a specific focus on younger ages, at a similar cost. In the third year, two additional centers should be funded for studies of particular minority groups, for example, Hispanic or Native American youths. In addition, the committee recommends $1 million for research grants dealing with mental health problems associated with childhood disorders in various minority groups; these funds should increase by $0.5 million annually. The first-year budget for this area would be $2.5 million, increasing to $6 million by Year 5.

The NIMH antisocial and violent behavior program, which deals with problems that have enormous consequences for society, now expends $3.1 million for research. The problems addressed include delinquent and antisocial behavior and child abuse. Grant proposals dealing with antisocial and violent behavior come from scholars in many different research areas. The committee recommends a budget of $4.5 million in the first year with an increase of $0.5 million per year thereafter throughout the five years of the initiative, for a Year 5 total of $6.5 million. Approvable grant applications for this program did not exceed funds available during the last fiscal year. However, it is anticipated that with greater awareness of these programs in the child mental health research field, more applications will be forthcoming for research in this important area.

Services and Systems of Care — First Year: $ 4.0 million; Fifth Year: $10.0 million

NIMH has recently put forth a new research initiative in the area of services research that examines the impact of mental health research across a variety of settings. In addition to hospitals and clinics, schools are often involved in the care of children and adolescents with chronic mental illness, yet decisions within most school systems are made without the benefit of contributions from persons with experience in mental disorders. It is critical to determine the degree to which diagnoses are accurate and interventions appropriate. Is the range of needed services being provided? What provisions are there for delivery of services by mental health specialists, as well as by other types of providers, including educators and pediatricians? What would be model reimbursement programs and quality assurance mechanisms for treatment and rehabilitation services to mentally disordered children and adolescents?

The current budget in this area is $1 million, not counting the funds provided by the Health Resources and Services Administration (HRSA) for collaborative studies in this area. Given the response of the field to the recent NIMH research initiative in this area, and the available pool of scholars and potential grantees, the committee believes that the mental health services area at NIMH could effectively use $4 million immediately. Research grants would account for $3 million, increasing by $.5 million in the second year, and $1 million each subsequent year for a fifth-year allocation of $6.5 million. The remaining $1 million in the first year should be used to establish a center for services research focusing on childhood mental disorders. A second center in this area should be funded in year two, also at a cost of $1 million. Funding for three other existing centers should be augmented by $.5 million each so as to permit an expansion to include research on services for children. Thus, by the fifth year, there would be two full centers and three partial centers devoted to mental health services research on children at a cost of $3.5 million.

Basic Behavioral and Social Sciences — First Year: $17 million; Fifth Year: $27 million

Funding of basic behavioral and social science research requires increased support for individual research grants and for multidisciplinary centers. This research often involves longitudinal studies, which are inherently expensive and require stable funding.

NIMH currently has five categories of research in these areas: cognition and learning, family processes, personality and emotion, interpersonal processes, and behavioral psychophysiology and socio-physiology. The latter programmatic area, which was established recently, focuses on how physiology is changed by the psychosocial environment and the ways in which psychosocial and biological processes interact.

The current research budget for all five areas is $10 million, which supports 58 grants nationwide; there are no program projects and no multidisciplinary centers. The committee recommends that the budget for regular research grants be increased by $4 million the first year, with a $2 million increase in each of the subsequent years. In recent years, NIMH has received highly deserving grant applications in these areas totaling several million dollars that cannot be funded. The committee also proposes that two program projects or centers be started in the first year, with an additional center in Year 3 and one in Year 5, at a cost of $1 million each per year.

Equipment and facilities are also needed. Researchers need computers, testing apparatuses, video and audio recording devices, and

other tools for their investigations. Such equipment has greatly improved the efficiency of research in this area over the past few years, and investigators need support to modernize their laboratories. The committee recommends that $1 million a year be included for this purpose.

Basic Neuroscience

First Year: $18 million
Fifth Year: $40 million

Developmental neurosciences are those aspects of the neurosciences that relate most directly to mental disorders of children. NIMH currently supports three broad areas of developmental neuroscience. Developmental neurobiology deals with the organization and growth of neural circuits. Developmental behavioral neuroscience is concerned with biological factors relevant to such behaviors as memory and learning, sleep, and aggression. Developmental pharmacology and toxicology addresses the effects of various drugs and their impact on the developing nervous system as well as efforts to improve drug treatments for mental disorders of childhood.

The total allocation for neuroscience research related to child and adolescent mental disorders is estimated at $4.3 million; the number of grants nationwide is 20. The scientific promise of this area, the many neuroscientists with potential contributions to understanding child and adolescent mental disorders, and the fact that work could begin at once in a variety of disciplines and departments all argue eloquently for a marked increase in funding. The immediate funding of strong proposals not now being supported would require at least $2 million. With increases in the budget, more investigators would apply, so that a further $2 million, for 10 additional grants averaging $200,000 each, is easily justified. The proposed allocation for Year 1, therefore, would be $8 million. The committee proposes that the amount made available be increased by $2 million per year in each subsequent year, so that by Year 5 at least 80 grants are being supported.

Equipment is a critical need for many researchers in this area. The committee recommends that $2 million be provided immediately for the purchase of state-of-the-art equipment for biological research, with the same level of support continued in subsequent years.

NIMH currently supports no program projects or center grants in developmental neurobiology research, although the need for them is strong. The committee recommends funding now for 2 such focused efforts at a cost of $1 million each with 2 additional program projects in the third year and again in the fifth year. Year 1 costs would be $2 million, increasing to $6 million in Year 5.

The committee identified a clear need for centers for neuroscience and mental disorders of children. These would facilitate cross-disciplinary research on childhood disorders (and precursors of adult disorders) by bringing together basic neuroscientists and clinicians involved in biological investigation. The cost of such centers is estimated at $2 million per year. Two such centers could be funded in the first year, with one additional center in each of the subsequent three years, for a total of five centers.

Imaging techniques have made it possible to look at brain structure and function in living human beings. Such techniques have immeasurably expanded the potential for research on adults. The committee proposes that NIMH provide funds immediately to support collaborative research between child and adolescent mental health researchers and existing imaging facilities. In Year 1, $2 million should be set aside for four collaborative programs. In addition, NIMH should move toward establishing two imaging centers for children and adolescents by Year 3, at a cost of $1 million per year each. Two additional centers at the same cost should be added in Year 5. These centers should devote a major portion of their activity to developmental problems and to the noninvasive study of child and adolescent disorders. Actual costs of establishing these centers undoubtedly would be higher, but they could be shared with other disciplines needing these research tools.

NIMH Intramural Research Program — First Year: $ 8.5 million; Fifth Year: $10.5 million

One of the striking early successes of NIMH was its stimulation of progress in the field of mental health by vigorous intramural programs in a range of basic and clinical research areas. Increased funding of intramural programs should therefore be an integral part of the overall effort to expand research in child and adolescent mental health.

Child and adolescent mental health receives only 7 percent of the $62.6 million total NIMH intramural research budget. The two programs that currently exist are models of interdisciplinary research. Their estimated funding is approximately $4.5 million. The committee recommends increasing that funding by $0.5 million per year.

NIMH has been considering the establishment of a new clinical research unit that would focus on severe mental disorders of children. The facility would include a related basic science laboratory. The committee suggests that NIMH consider focusing this unit on children with both mental retardation and mental disorders. Such a research program might serve as a national model; its cost would be $2 million per year. NIMH should also establish a developmental molecular neurobiology laboratory. Plans have been made for such a

laboratory, which would cost $1.5 million, but no funds have yet been made available for it.

The total costs of enhanced intramural programs of NIMH for child and adolescent mental health research would be $8.5 million in Year 1, increasing to $10.5 million by Year 5. All of the proposed program expansions could be effected immediately.

NIMH Institute-Wide Consortium

An institute-wide consortium concerned with child and adolescent mental health research should be established at NIMH. This group would have authority and responsibility for directing and orchestrating child- and adolescent-related research programs across the institute. An associate director of NIMH for children and adolescents should provide full-time leadership for the consortium, which would consist of appointed representatives from each of the major research divisions within the extramural program as well as representatives from intramural research. Representatives of the Division of Extramural Activities (that group in NIMH charged with providing the initial scientific review of grant proposals) would also be included. This new administrative structure would have permanent support staff.

Although the Child and Adolescent Disorders Research Branch has existed within the NIMH extramural program since 1985, it has not provided administrative oversight for the majority of child and adolescent research programs that are actually being conducted under the auspices of NIMH. As a result, it may not be appropriate, even with an anticipated increase in staff support, to place the responsibility for implementing this program solely on the shoulders of the Child and Adolescent Disorders Research Branch. It can be expected to play an important role in the implementation of the research plan, however, particularly in the development of multicenter studies. Ideally the program staff of child branch would be full scientific partners in these cooperative efforts.

One issue that the consortium should address immediately is the initial review of research proposals. There are two reasons for this: (1) the increased burden that implementation of this plan will place on the initial review procedures, and (2) the fact that the current review process is very widely dispersed, with as many as 11 of the 20 initial review committees involved in the process.

Given the need for capacity building, innovative review procedures may be desirable. One approach would be to focus on areas of great need and high priority (such as center grants, longitudinal research, mental health services research, or research that requires a linkage between basic and clinical investigators) and encourage several rounds

of review, with some incentive at each level. Such a system might solicit a brief research prospectus from interested collaborative groups or individual investigators. The most promising of these would then be supported while a more detailed proposal was prepared. A final round of review would then decide which specific programs to fund.

There is an acute need for review by knowledgeable peers; this may require some restructuring of existing committees, possibly including the establishment of one or two research review committees for child mental health. It is also expected that many of the new research initiatives will require detailed requests for applications and perhaps also separate review and funding arrangements to ensure that support is available for specific high-priority areas. For example, much care will need to be taken in developing a series of longitudinal studies, with special advisory boards and review committees being empaneled.

Once established, this NIMH consortium should seek a leadership role in advocating child and adolescent mental health research among the other federal agencies which are at least partially concerned with the health of the nation's children. This would include the National Institute on Alcohol Abuse and Alcoholism, the National Institute on Drug Abuse, the National Institute of Child Health and Human Development, the National Institute of Neurological and Communicative Disorders and Stroke, the Centers for Disease Control, Health Resources and Services Administration, etc. It will also be essential to involve state mental health agencies; NIMH will then be able to encourage interagency research on the mental health of children and adolescents.

Another important activity this consortium may wish to consider is convening a meeting of many of the major private foundations concerned with this area of research in an effort to facilitate better communication and planning. A crucial consideration at these meetings would be long-range capacity-building. Historically the private sector has provided invaluable support and encouragement in this field. The William T. Grant Foundation, the Robert Wood Johnson Foundation, the Carnegie Corporation of New York, and, more recently, the John Merck Fund and MacArthur Foundation deserve special recognition for their efforts on behalf of child and adolescent mental health research.

Some funding will be necessary to create and maintain the NIMH consortium, but it is unclear how much. The committee's recommendation of $1 million is an estimate. Too often, new programs are initiated without adequate attention to the kinds of personnel they need. If this consortium is to foster a rapid increase in research within the field of child mental health, NIMH almost certainly will need to create 10 to 12 administrative positions and 2 or 3 support positions.

CONCLUDING PERSPECTIVES

The committee would find the diversity and complexity facing investigators conducting research on the mental disorders of children and adolescents daunting if it were not for the great promise of scientific study--a promise that is only now beginning to be realized. In the course of its study, the committee became aware of both how much momentum has increased in the field in the past 20 years, and how important it is to build this country's research capacity to capitalize on these advances.

Advances in genetics, neuropharmacology, brain imaging, epidemiology, neurochemistry, developmental psychology, neuropsychology, social systems research, and other branches of knowledge have provided clinical investigators with new methods and theories for approaching the disorders of individual children and adolescents. Better tools for identifying vulnerability to disorders should lead to even more advances in prevention, and better methods of assessment will guide efforts to improve the treatment of children who are already burdened.

In any area of study as vast and complex as child and adolescent mental health, competing research perspectives and priorities are to be expected. However, the committee recognizes the need for interdisciplinary perspectives and for research approaches that are sensitive both to psychological and social factors and to biological issues. Research that focuses exclusively on one domain--a dichotomy that has been vividly conveyed by the metaphors of "mindless" or "brainless" research--does not do justice to what is known about the processes of mental development. Interpersonal and environmental forces profoundly, sometimes permanently, change the structure and the function of the brain and other biological processes; conversely, a child's biological endowment powerfully influences how he or she will perceive and interact with the external environment and what impact those experiences will have on him or her.

The committee's evaluation of the field of child mental disorders research leads it to conclude that no single approach or small group of studies has overriding importance. The field must move ahead in a broad-based fashion. In the ecology of research, there are synergistic relations between different approaches, both basic and applied; similarly, there are intertwined needs for support for research, expansion of research training, and the development of the infrastructure for research. A national plan for child and adolescent mental disorders research that embraces this philosophy holds great promise for the nation.

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INDEX