

A Study of Interactions: Emerging Issues in the Science of Adolescence Workshop Summary

Program Committee for a Workshop on the Synthesis of Research on Adolescent Health and Development, National Research Council

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A STUDY OF INTERACTIONS

EMERGING ISSUES IN THE SCIENCE OF ADOLESCENCE

WORKSHOP SUMMARY

Alexandra Beatty and Rosemary Chalk, *Rapporteurs*

Program Committee for a Workshop on the Synthesis of
Research on Adolescent Health and Development

Board on Children, Youth, and Families
Division of Behavioral and Social Sciences and Education

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Preface

This volume summarizes a two-day workshop convened in September 2005 that reviewed emerging research findings related to the biological, behavioral, psychological, and social processes that occur during adolescence. These complex processes are attracting increased attention because new research now makes it possible to identify certain interactions among brain structures, hormonal changes, other biological and behavioral impulses, and the contextual settings that surround and engage young people. Many researchers believe that such interactions provide important clues and underlying explanations for the solution of serious problems that frequently emerge during adolescence: alcohol and other substance abuse, mental and behavioral disorders, unhealthy sexual conduct, violence, school failure and delinquency, and other social and health disorders.

All too often, the confinement of studies of adolescence within certain fields of research impedes cross-disciplinary analysis and recognition of common risk factors and opportunities for positive interventions. In addition, much of the basic research literature, experimental studies, and longitudinal analyses of adolescent health and development are scattered across multiple scientific disciplines and research centers. The workshop was thus intended to provide an opportunity for an interdisciplinary group to explore the current research landscape and to consider links among the disciplines—links that might be useful in both moving the field of adolescent studies forward and helping to translate emerging research findings into

policy and practice. The time frame for the workshop was by no means sufficient for a comprehensive overview of even the primary issues related to adolescent health and development. The participants sought instead to identify a few key areas that show promise in advancing the understanding of fundamental processes that occur during adolescence. They were also asked to provide perspectives on the state of study in their own fields and to consider whether transdisciplinary work would help advance these studies.

The overarching goal of the workshop was for participants to consider whether a broad synthesis of the emerging research base could help advance understanding of the science of adolescence, and, if so, how such a synthesis might be prepared. The proposed synthesis was viewed as a future companion report to the earlier National Academies study *From Neurons to Neighborhoods*,¹ which examined the broad array of factors that affect early childhood development and argued convincingly that a science base could inform the practices involved in caring for and educating very young children.

The initiative for this workshop was first developed by Robert Blum, former chair of the Committee on Adolescent Health and Development of the National Research Council (NRC) and the Institute of Medicine (IOM). The proposal was further reviewed and refined by the NRC-IOM Board on Children, Youth, and Families. The Office of Adolescent Health in the Maternal and Child Health Bureau of the U.S. Department of Health and Human Services subsequently funded an activity that included the formation of a program committee that met once to help plan and convene the workshop. The efforts of the planning committee members and the workshop participants fostered a collaborative effort designed to begin to unravel a challenging and multifaceted area of study.

We are particularly grateful for the contributions of the expert presenters who agreed to prepare background papers to inform the workshop deliberations as well as the other speakers and discussants who contributed to the meeting (see the appendix for the workshop agenda and list of participants). Special appreciation also goes to the members of the planning committee, who volunteered their time and intellectual efforts to shape the

¹National Research Council and Institute of Medicine. (2000). *From Neurons to Neighborhoods: The Science of Early Childhood Development*. Committee on Integrating the Science of Early Childhood Development. Jack Shonkoff and Deborah Phillips, eds. Board on Children, Youth, and Families, Commission on Behavioral and Social Sciences and Education. Washington, DC: National Academy Press.

workshop program and identify themes and contributors. In addition, we give special thanks to Alix Beatty, who prepared a comprehensive draft for the summary report, and Wendy Keenan, who assisted with the production of the final publication. The summary report was prepared by rapporteurs who attended the workshop, but it does not represent findings or recommendations that can be attributed to the planning committee members.

This workshop summary has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the Report Review Committee of the NRC. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the charge. The review comments and draft manuscript remain confidential to protect the integrity of the process. We thank the following individuals for their review of this report: Nancy Birkhimer, Teen and Young Adult Health Program, Maine Center for Disease Control and Prevention, Maine Department of Health and Human Services; Ronald E. Dahl, Western Psychiatric Institute and Clinic, University of Pittsburgh Medical Center; Charles E. Irwin, Jr., Division of Adolescent Medicine, University of California, San Francisco; Becky Judd, Division of Behavioral Health, Alaska Youth Services; and Michele D. Kipke, Saban Research Institute, University of Southern California Children's Hospital, Los Angeles.

Although the reviewers listed above provided many constructive comments and suggestions, they were not asked to endorse the content of the report nor did they see the final draft of the report before its release. The review of this report was overseen by Nan Marie Astone, Department of Population and Family Health Sciences, The Johns Hopkins Bloomberg School of Public Health. Appointed by the NRC, she was responsible for making certain that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the authors and the institution.

Rosemary Chalk, *Director*
Board on Children, Youth, and Families

1

Introduction

Scholars—and adults in general—have pondered for centuries the mysterious processes that influence the ways in which children gradually become adults. The word adolescence, which came into English in the 15th century, has a Latin origin, and Aristotle was an early observer who recognized adolescence as a distinct phase of life. The study of adolescence matured as a scientific endeavor during the latter half of the 20th century, and it has emerged as a distinctly interdisciplinary field of inquiry. Scholars of human development, pediatrics, psychology, sociology, anthropology, psychiatry, molecular biology, endocrinology, neuroscience, and many other fields have focused on adolescence and produced a wide range of findings. At the same time, policy makers, educators, community health specialists, and others concerned with the life challenges facing adolescents have looked for ways to use scientific findings to better serve young people and their families.¹

The development of professional organizations and journals devoted to adolescence, as well as increasing appreciation in academia and the world of policy for the importance of this phase of life, have helped this field catch up with the pace of research on other stages of human development,

¹The age range that constitutes adolescence is a subject of some disagreement. No firm definition of adolescence was used in planning this workshop, though the question of when it begins and ends was raised by participants as worthy of further discussion.

particularly infancy and early childhood. Over the past 30 years, the study of adolescence has exploded with breakthroughs that have pushed thinking about interactions among the complex systems that affect adolescents—from the endocrine system to the social peer group—forward at a dizzying pace. Researchers and practitioners are now exploring important connections among these complex systems, examining the impacts of different social environments on the development of biological systems and psychological processes. Similarly, many scientists are studying the relationships between certain biological factors and the motivations, impulses, and social behaviors of young people. The diversity of specialized fields and theoretical frameworks that have emerged in these studies has generated interest in the development of an integrated overview to provide more cohesion within the field and also to improve understanding of the implications of findings. But, despite past calls for interdisciplinary research (e.g. Millstein et al., 1999), the creation of a comprehensive synthesis of research that draws on very different intellectual traditions has remained persistently elusive.

The development of a comprehensive review of research on adolescence depends in large part on the perceived need for such a synthesis and the extent to which different research fields as well as policy and practice would benefit from such an effort. To address these issues, the National Research Council and the Institute of Medicine, through the Board on Children, Youth, and Families, held a two-day workshop in September 2005.

The workshop was designed as an opportunity for an interdisciplinary group to explore the different strands of research that contribute to understanding adolescence. In the brief time available, the group was not asked to address the entire range of issues related to adolescent health and development, but rather to provide an initial explanation of issues that a longer term study might address. The workshop planners began with the proposition that understanding the complex phenomenon of adolescence demands widely different theoretical and methodological perspectives.

In planning the workshop, the program committee developed a framework to identify the multiple settings and research disciplines that encompass the fields of adolescent science. Recognizing that one workshop could not address all fields within this framework, the committee sought to focus on a selected set of research domains that could provide the basis for examining interactions and processes within a transdisciplinary paradigm that cuts across individual fields of research. The planners had particular interest in highlighting scientific breakthroughs, as well as interventions that

apply research findings to benefit youth, their families, and the professionals who work with them.

To that end, the workshop planning committee sought to address the following objectives:

- To highlight emerging fields of research that are of particular relevance to understanding fundamental processes of adolescent and young adult health and development, including advances in biological, behavioral, and social sciences;
 - To consider frontier areas of research that are important to address but need further development;
 - To examine the strengths and limitations of different theoretical and developmental frameworks for the organization and classification of scientific knowledge about this field and adolescent and young adult age groups;
 - To identify opportunities for synthesizing research on adolescents and young adults that can contribute to the promotion of their health and positive developments, delivery of health care services to them, and the prevention of behaviors that jeopardize their current and future health, safety, and well-being; and
 - To examine the need for and feasibility of launching an in-depth contextual study that synthesizes adolescent and young adult research and connects its findings to advance health promotion and prevention services, programs, and policies for these age groups.

The workshop discussions presented a variety of perspectives—including detailed looks at a few key research areas—with the goal of fleshing out possible means of integrating research with policy and service needs. The presenters were chosen with the goal of reflecting the diversity of research topics and methodologies, but with the clear recognition that many other important issues and research areas could not even be touched on during the brief workshop session. Some of the presenters prepared papers for the workshop, which provide more detail about cutting-edge research as well as implications for treatment and intervention. Along with these papers, Power Point presentations also are available on the web site of the Board on Children, Youth, and Families at the National Academies (<http://www.bocyf.org/090805.html>).

This report summarizes the major themes discussed at the workshop.² It begins with an overview of what adolescence is and current views of the processes that shape development in the second decade of life. It explores the transdisciplinary research issues already presented in this field, as well as issues raised in discussions of goals for the field's future. A closing section describes the presenters' thoughts on the feasibility of launching an in-depth contextual study that could more firmly establish connections among the many fields of study concerned with adolescence.

²The themes have been shaped to produce a readable narrative, but this summary is confined to what was discussed during the workshop or presented in the papers submitted by the presenters.

2

A Portrait of Adolescence

To open the discussion, Robert Blum took note of some unprecedented challenges facing young people at the start of the 21st century: they are the first generation to grow up in a world characterized by instantaneous global communication and the threats of both AIDS and the widespread use of terrorism as a political weapon. They will be the first generation to fully compete in a global economy and the first generation of whom the majority will spend at least part of childhood in a single-parent household. The professionals who work with young people in this fast-changing environment need a clear understanding of the processes of adolescence, yet models for understanding this phase of life are rapidly changing in ways that can significantly influence practice.

Recognizing that significant changes are occurring in the social contexts in which adolescents live, workshop participants focused on selected areas in which social influences may interact with biological and behavioral processes that occur during the second decade of life. Thus, it was important that the workshop begin with an overview of critical processes that emerge during adolescence and explore current views of what is going on in the minds and bodies of young people. Presentations by Ron Dahl and Elizabeth Shirtcliff, organized around the theme of new insights on pubertal maturation and adolescence from a developmental framework, provided this grounding.

DEVELOPMENTAL CHANGES AND BRAIN MATURATION

An understanding of adolescence begins with recognition that different sets of changes occur along separate trajectories during the second decade of life—and that changes in each arena affect developments in others. It is also important to note the significant individual differences in the ways that children experience these changes. Some aspects of puberty, such as the onset of biological changes, begin at younger ages today than a century ago (at around age eight for girls and nine for boys): children grow in stature and begin to develop the physical characteristics of adults earlier; production of the hormones that control sexual development increases and leads to reproductive maturity at younger ages. In many traditional societies, the interval between attaining puberty and taking on adult roles (such as marriage and employment) was typically two to four years. More recently, this interval has stretched to an 8- to 15-year period, creating a prolonged period of dependency, and stretching out the acquisition of the skills and responsibilities of adulthood. Some of the workshop participants indicated that this lengthening of the transition period may be one of the most important sources of change in the adolescent period over the past 100 years. It has also stimulated the development of a new set of studies focused on the population of 18- to 25-year-olds, who are increasingly viewed as encountering a separate stage of development termed “emerging adulthood.”

Changes in mood and emotions occur during adolescence as well—as parents frequently observe, teenagers may rather suddenly display such changes as new emotional intensity, increased interest in romance, increases in risk-taking, and changes in sleep patterns. These affective developments may also be linked to the endocrine system, although the mechanisms through which this takes place are less well understood.

Cognitive maturation typically occurs less suddenly, Dahl noted, and is independent of sexual development. It correlates more with age and maturity, and new research has been emphasizing that fundamental changes in brain development occur much later than had been recognized—continuing long after puberty is over. Children’s capacities for logic, reasoning, and planning continue to grow throughout adolescence, as do their problem-solving skills and capacity to understand the long-term consequences of their behavior—these capacities are far from fully developed as puberty is reached.

The slower pace and more diffuse nature of cognitive development—and the fact that it occurs independently of other developmental changes—

are particularly important to the overall picture of adolescent behavior. As data from a number of countries have established, the adolescent period for young people in the developed world has lengthened dramatically over the past 100 years. While the onset of puberty has occurred at ever-younger ages, the time frame for cognitive development and the development of adult skills has remained unchanged. As a consequence, many young people today reach sexual maturity by the time they are 12 or 13, on average, yet cognitive maturity does not come until their early 20s.

This increase from what used to be a 2- to 4-year interval to a period of 8 to 15 years has posed significant new challenges to adolescents and the adults and institutions with whom they interact. At the same time, changes in social norms and expectations as well as cultural developments—from music and clothing styles to technology—have dramatically affected the contexts in which young people in the developed world are growing up.¹ The lengthening of adolescence interacts with the changing environment of adolescence to “turbocharge” the strong emotions and exacerbate the gap between some young people’s physical abilities and motivations and their ability to process information and regulate their behavior. Dahl referred to this situation as the “tinderbox in the teenage brain,” which can cause difficulties in the presence of certain stressors or the absence of key supports.

INTERACTING INFLUENCES

Social context and the independent trajectories of sexual, affective, and cognitive development are just some of the many other factors that influence outcomes for young people. Looking at any of them alone would yield an incomplete and potentially misleading picture of adolescence, but the interactions that affect adolescents are even more complex than this list suggests. Dahl emphasized the importance of studying adolescence within a developmental framework, that is, an approach in which the concerns of psychiatry, pediatrics, endocrinology, affective neuroscience, and other fields can be integrated in an understanding of other forces that influence stages of change and developmental outcomes. He focused his presentation

¹The workshop focused primarily on the adolescent experience in the United States. *Growing Up Global* is an in-depth study that examines the adolescent transitions in the developing world (National Research Council and Institute of Medicine, 2005).

on neurobehavioral changes—reward seeking, sensory stimuli, and the development of emotion regulation—to highlight how interactions among different phenomena can amplify individual differences among young people and also to demonstrate the value of transdisciplinary research for benefiting both clinical work and social policy.

Dahl described early adolescence as a period of brain development that creates unique vulnerabilities and opportunities, and one in which achieving a successful balance is challenging. During puberty, pubertal-related hormones directly influence physical drives (such as appetite and sleep), motivations, and emotions, whereas cognitive and regulatory controls over behavior are established in a more gradual and indirect manner. The increasing gap between these two processes creates a time of increased vulnerability and risk as well as opportunities to develop particular strengths and positive behaviors. Strategies that strengthen social support, or “scaffolding,” especially during vulnerable intervals, are thus critical means of supporting youth, particularly those who are growing up in high-risk environments. What is especially important during this time is enhancing the adolescent’s ability to control and regulate emotions in navigating unfamiliar social situations, a skill that is related to self-control. The lack of these skills is related to impulsivity, reckless behavior, and problems in resolving complex emotional situations.

Recent research also suggests that puberty is a time of significant malleability in the neural systems that underpin behavior, emotions, and decision-making. The affective changes—ranging from increased sexual interest and emotional intensity to risk-taking and sensation seeking—that adults observe are the manifestations of this malleability.

Emerging neuroscience studies on the brain structure, hormonal processes, and neural signals that influence behavior control, Dahl explained, offer important implications for understanding adolescent behavior. Complex pathways emerge within the adolescent brain for evaluating situations, reacting to them emotionally, and assessing possible reactions. The strength and speed of the neural connections that govern these functions are shaped by genetic traits, by experience, by social context, and by learned emotions. For adolescents, these pathways are developing. This biological process, combined with incomplete cognitive development and the challenges presented by the environment in which a child lives, make adolescents particularly vulnerable to emotional and behavioral difficulties (e.g., depression, social anxiety), regulation of appetite and reward motivation (e.g., sub-

stance abuse, eating disorders), and impulsivity (e.g., antisocial behavior, excessive risk taking).²

Furthermore, these neurological developments take place in a context, and they are influenced not only by the social environments that surround young people but also by their own choices and preferences as well as the consequences of their decisions. Genetics dictates some aspects of temperament and may predispose individuals to physical and mental characteristics that affect their daily lives. Attitudes and actions are in turn shaped by these circumstances, which are then complicated by the developmental process of adolescence and by the social context. These dynamic models of person-environment interactions are gaining increasing attention, Dahl suggested, as researchers realize that adolescents become active agents in shaping their own social settings and experiences. They select certain types of settings and context as a means of regulating their own behavior, arousal, motivation, and emotions. At the same time, certain contexts (especially those that involve electronic media) deliberately recruit teens through the enhancement or manipulation of selected sensory and emotional triggers. Broader awareness of these triggers in the social environments of youth can help intensify protective factors, discourage vulnerabilities and influences that lead to negative trajectories, and enhance their potential for self-regulation.

Thus, to look at a concrete example, a girl may put on weight as puberty begins. A genetically based vulnerability to depression, combined with the negative attitudes of a peer group that prizes thinness, may intensify her reaction to a small weight gain. Cognitive immaturity makes it difficult for her to put the situation in perspective. Mood swings (possibly hormone related) and social anxiety intensify her reactions, and she may develop an eating disorder. The presence of the eating disorder may affect both her health—even hormone levels—and her relationships with her parents and peers, which in turn affect her ability to handle further challenges, and so on. The issue of teenagers' sleep needs, described in Box 2-1, provides another example of the influence of interactions among many factors, yet all too often little attention is paid to these underlying interactions in studies of the treatment and prevention of health disorders, such as obesity and many others in adolescent populations.

²Some researchers dispute the view of adolescence as a time of impulsivity and invulnerability (see work by Millstein et al., 1999, and Millstein and Halpern-Felsher, 2002).

Box 2-1 Teenagers and Sleep

Parents often complain about teenagers who want to sleep until noon. Recent efforts to persuade school officials to adjust high school start times to accommodate teenagers' sleep patterns attest to growing recognition that their circadian rhythms are different from those of adults and younger children. Two changes in sleep patterns have been specifically linked to puberty. First, because of rapid growth and development, teenagers need more sleep overall and show both daytime sleepiness and a need to catch up on sleep on weekends. At the same time, their circadian rhythm shifts slightly toward staying up later at night and sleeping later in the morning.

Ron Dahl used the sleep issue in the workshop discussions to illustrate his broader point about interactions. Teenagers' sleep needs have become a problem in part because stimulating activities—television, music, computer games, phone and email conversations with friends—are available to them in the late evening, which exacerbates what would otherwise be a mild tendency to be wakeful. The shortage of sleep that results affects adolescents' functioning, sometimes in drastic ways. Significant impairment of cognitive function, emotions that lurch out of control—these effects of sleep deprivation can lead to significant stress on their own, which can in turn exacerbate problems with sleeping.

As Dahl put it, “you can't study sleep without going across disciplines.” Sleep deprivation can be a tipping point that pushes a struggling child over the edge into dysfunction, and it is influenced by sociocultural and social factors, parenting, and policy (school start times), as well as the neural, cognitive, and hormonal activity of adolescence.

The interrelationships among the factors that influence this hypothetical girl's development are complex, and they illustrate how easy it is for the balance to tip in the direction of dysfunction for a given child. Dahl emphasized, however, that in this dynamic person-environment interaction, the presence, support, and interventions of caring adults can make a major difference in the outcome for a child. While some have argued in the past that peer influence begins to supersede the influence of parents and other adults during adolescence (Harris, 1998), this is far from definitely proven. Parents may exert influence in different ways as their children age, and the effect is still profound.

HORMONES— EVEN MORE COMPLICATED THAN YOU THOUGHT

While many neuroscience studies focus on biological changes associated with brain development, others are reexamining assumptions about the hormones that are “raging” during adolescence. These newer studies offer another perspective on interactions among and nested relationships within neurobehavioral models and social context models that influence the affective developments of adolescence. Elizabeth Shirtcliff offered some thoughts about the neuroendocrine contributions to pubertal development and the current state of research in this area (Shirtcliff, 2005).

Shirtcliff pointed out that hormones are important biological markers for endocrine mechanisms that influence normal developmental processes as well as regulatory disorders. Hormones identify areas of vulnerability or a biological predisposition that may be subject to change in certain settings or after certain interventions. She explained that hormones function differently in adolescents than in adults, noting that the links between hormone levels and behavior are not as direct as was once thought. Levels of many of the hormones that are thought to “rage” in adolescence are actually higher in adulthood than in adolescence. Moreover, hormones cycle rapidly, and their cycles rarely correspond directly to cyclic changes in mood or other behaviors.

One important recent finding, Shirtcliff observed, is that certain hormones are very active early in a child’s life, even in utero and during the first two years of life. During early childhood a large inhibitory control, or brake, emerges in the endocrine system that is not lifted until the onset of puberty. This overarching hypothesis is known as the organizational activational hypothesis. The basic underlying idea is that the reawakening of certain hormonal impulses following a long period of dormancy can increase the potential for disequilibrium which in turn has large and long-term effects on behavior. This is because the cyclic hormonal systems and the feedback loops between the brain and other regions of the body are just getting established. Shirtcliff discussed three sub-hypotheses of the organizational activational hypothesis that each focus on different processes. Proponents of the adjustment model, for example, suggest that adolescents are more sensitive to very small hormonal fluctuations because their bodies are in the process of adjusting to the reactivation of a number of hormones. The same hormones may have very different effects in adults, perhaps in part because the shifts in level during adolescence are more abrupt and irregular.

The biosocial model, by contrast, focuses on interactions between hormone levels and social context—and is supported by data showing that high-quality relationships with parents seem to protect teens from the potentially damaging effects of extra high or low levels of testosterone. In a third view, the mediation model, hormones play a secondary role in influencing behavior. Body changes for which hormones are responsible, such as the development of secondary sex characteristics, are actually the prime influences on behavior. Thus, for example, the body changes of puberty can occur rapidly or can make a child feel out of sync with his or her peers for a variety of reasons—and it may be these effects that influence body image, social relationships, mood, and other areas that fluctuate during these years.

Shirtcliff highlighted interactions among biological and social factors that influence adolescent behavior. She noted that not only can individual hormone function predispose a child to a particular disorder, but also that evidence increasingly suggests that social context can affect the way hormonal effects are expressed. Certain interventions focused on settings and social processes, such as those that increase social support or decrease levels of stress in an individual's environment, may actually affect hormone function or the expression of certain hormonal influences. For example, high levels of testosterone might contribute to leadership or social dominance in one context or to deviance and risk-taking behavior in another. The presence or absence of parental support or other caring adults may be an important contextual variable that can influence these types of outcomes through the regulation of impulsivity, self-control, and navigation of complex emotional signals. Shirtcliff emphasized that the brain serves as the hub of interactions among the endocrine system, the body's neurocircuitry, social context, and behavior—and that findings from a variety of disciplines are necessary to understand the pathways and implications of these interactions.

Some specific, intriguing questions about these interactions remain unanswered. Shirtcliff noted, for example, that the influence of the neuroendocrine system on parent-child conflict, mood swings, drug use, and other problems has not been well examined. She also pointed out that much existing research fails to take into account potential gender or ethnic differences, and that significant differences in terms of timing and many other factors may have important implications for understanding the way hormones influence adolescent behavior. In short, the interactions of neuroen-

ocrinology, biological processes, and social settings are arenas in which transdisciplinary research is clearly needed.

CHANGING CONCEPTUAL MODELS

Blum observed that the last major synthesis of research on adolescent health and development was prepared by the Office of Technology Assessment in 1991 (U.S. Congress, Office of Technology Assessment, 1991). Since that time, significant shifts in thinking about adolescence have occurred that can affect the expectations of parents and the other adults who work with teenagers. He noted, for example that as recently as 1990, gender-specific behaviors were largely attributed to social learning. Today, research advances have shown that the neuroendocrine system affects gender variations, and that these differences have significant effects on information processing, learning, and behavior. Blum also observed that researchers in 1990 believed that parental influences diminished as peer influences increased during adolescence. Today, there is agreement that parents remain as critical during adolescence as they were in childhood, even as peer influences increase. For example, such studies as the longitudinal Adolescent Health survey have demonstrated that the presence or absence of maternal support during early stages of adolescence can influence the timing of first sexual encounters as well as the number of partners for young girls (Centers for Disease Control and Prevention, 2003).

Over the same time period, those who study adolescence have generally moved from a conceptualization of adolescence grounded in the stages of life described by 20th century scholars, such as Piaget and Erickson, to an ecological model in which contextual factors and social settings are viewed as major sources of influence on developmental processes in a young person's life. As a result, increasing attention is focusing on the ways in which social and cultural factors in the environment of today's youth exacerbate or soften sources of stress and disruption that influence biological, behavioral, and developmental processes.

Another significant conceptual shift has been from a risk or deficit model—a focus on all that can go wrong with teenagers—to what is called a positive youth development model. Such a model—particularly relevant to the design of programs for young people—incorporates protective factors and emphasizes ways of tapping young people's passionate enthusiasms, energy, and potential in positive ways (National Research Council and Institute of Medicine, 2002). While the positive youth development

model, discussed in greater detail below, has had an important influence, many youth programs and policies remain focused on adolescence as a time of high risk. Several presenters offered perspectives on the most prevalent dysfunctional behaviors while also expressing frustration with the persistent compartmentalization of research communities, which inhibits their ability to address underlying processes that cut across many of these problem areas.

3

A Time of Risk

Adolescence is a very healthy time of life—a time when the susceptibility to illness characteristic of childhood ebbs; a time when strength, speed, reaction time, and other capacities are beginning to peak; and a time when resistance to cold, heat, and hunger, as well as the capacity to recover from injury, are all stronger than at other times of life. Despite these assets, overall morbidity and mortality rates increase by 200 percent from childhood to late adolescence, as Ron Dahl pointed out. It is mainly difficulty in controlling their behavior and their emotions that put teenagers in harm's way—high rates of accidents, suicide, homicide, depression, substance abuse, eating disorders, violence, risky sexual behavior, and reckless behaviors in general are the primary causes of injury, illness, and death among young people.

Presenters who addressed the risks of the adolescent period reinforced the theme of complex interactions among multiple influences. The combination of an incompletely developed capacity for decision making, the impulsiveness and stimulation-seeking characteristic of teenagers, their heightened sensory impulses, and their relative emotional volatility—all occur in the context of a culture that is replete with enticing portrayals of risky behavior and other sources of risk for young people.¹ This mix of develop-

¹The Board on Children, Youth, and Families convened two planning meetings in 2004 that explored aspects of adolescent decision making and adolescent connectedness that are relevant to this discussion. Copies of the background papers prepared for these planning meetings can be found at <http://www.bocvf.org/043004.html> and <http://www.bocvf.org/100804.html>.

mental vulnerabilities and social environments that do not provide sufficient supports and protection creates a high potential for harm.

DEPRESSION

Between 20 and 30 percent of adolescents have one major depression episode before they reach adulthood, and the rate increases significantly after puberty. Depression is a serious and potentially debilitating health problem, and it is also linked to virtually all other prevalent adolescent disorders. David Brent, Daniel Pine, and Bruce Compas addressed some of the key factors and interactions that influence the onset and course of adolescent depression, interventions and treatments that are currently available, and thoughts about future directions for research, treatment, and prevention.

Brent showed a chart that illustrates the interrelationships among the various factors that are linked to the development of depression, which served not only as a useful aid to understanding adolescent depression, but also provided a tool for understanding other risks that were discussed during the workshop (see Figure 3-1). Genetic and biological factors—including hormone levels, family adversity, temperament, and the effects of parenting—all play a role in depression, as well as other adolescent problems.

Brent asserted that while some professionals focus on binge drinking, others on depression, and still others on eating disorders, distinctions

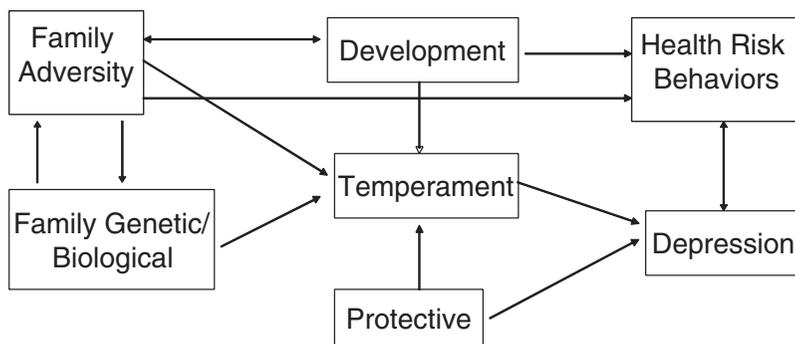


FIGURE 3-1 Overview of risk and protective factors.
SOURCE: Brent (2005).

among these problems are fundamentally arbitrary. Many of these problems are linked by common underlying causal factors. He has found that his own professional attention has focused on younger and younger children as he looks for ways to head off depression. He argued for the value of tackling the common risk factors in younger children before they begin to cause dysfunction. If common factors link multiple problems that are frequently expressed in different forms (substance use or school failure, for example), he explained, the widely held view that treating depression will in most situations take care of the other problems a child may be facing may not be accurate. Improving the overall health of younger children before their behaviors become rooted in certain patterns could potentially prevent them from being affected by certain risks—so that they do not, for example, end up associating with deviant peer groups, experimenting with drugs or alcohol, and generally, as he put it, “manufacturing” other problems.

Three approaches are available for treatment of adolescent depression: antidepressant drugs, cognitive behavior therapy, and interpersonal therapy. There is evidence for the effectiveness of each—and for improved efficacy when drug therapy and behavior therapy are combined. However, the treatments are not effective enough to address the need—depression is persistent and tends to recur. Some evidence indicates that adolescents respond differently to drug therapies than do adults, and individual differences also occur in the way adolescents respond to all the available treatments. Such factors as early puberty (especially in girls), adversity or stress in the home, abuse, peer group and parent-child relationships, family history of mental disorder, and other genetic factors, can all increase a child’s vulnerability to depression and can affect the outcome of treatments as well.

The factors that protect kids are the inverse of these risk factors. A positive parent-child relationship that includes supervision and the setting of clear expectations, family leisure time spent on shared interests, connections with school and investment in achievement, the formation of friendships within a prosocial peer group—all help a child navigate challenging situations successfully. Moreover, a child who experiences depression (or other mental illness or significant stresses) at a young age can easily miss out on positive experiences that potentially could affect his or her development in a host of ways. The effects are mitigated if that child receives treatment promptly and is supported in other ways by family members or other caring adults. As Brent put it, “It is not genes. It is not environment. It is genes times environment.”

Daniel Pine reinforced that point, using the example of what he termed the “fear circuit” in the brain. He noted that the relationship between brain function and psychiatric disorders as they are currently defined is not precisely understood. Nevertheless, studies of fear conditioning in rats and humans—in which the subject learns to associate a frightening stimulus with certain circumstances—have yielded insights into the more complex mechanisms of anxiety disorder, which is closely linked to depression. Different brain structures that are involved in detecting a stimulus, evaluating it, and taking action, mature at different rates. As a result, children’s responses, as well as the development of neurological response pathways, can be significantly affected by the presence or absence of certain life experiences as well as by medications. The implication is that adolescence is an especially sensitive time, in terms of brain development, and that environmental stressors may be more likely to lead to anxiety disorder and depression at that time of life than at others.

Speaking as a practitioner, Brent was interested in the ways research can improve outcomes for kids. For example, greater understanding of the predictors of young people’s responses to treatments can help practitioners increase recovery rates and decrease the likelihood of relapse. The role of contextual factors that may be critical to improving outcomes—particularly history of abuse, poor parent-child relationships, and deviant peer groups—has traditionally been ignored in clinical trial research, which provides the data on which pharmacological treatment and dosage guidelines are based. Finally, other factors may underlie the variation in adolescents’ responses to treatment, such as variations in brain structure and activity, chemical responses to therapies or other biological variations, and variations in neurological function and response. These underlying forces also have the potential to explain a great deal about variations in the ways young people experience depression and respond to drug therapies or other treatment.

Bruce Compas reinforced the points made by both Brent and Pine about the links between brain function and environmental influences. He presented specific results from his own research demonstrating that environmental stressors impact children’s somatization and affect, at least in part, neurological processes.

In another study, Compas and his colleagues examined the way coping skills operate in children under stress. They found a relationship between secondary-control coping, or conscious coping behavior, such as rethinking a situation or focusing on positive aspects of it, and (automatic) executive

inhibitory processes in the brain that take place in the prefrontal cortex of the brain. They also found that stress affects both kinds of coping, impeding the individual's capacity to respond effectively. This finding is important for understanding why and how such factors as a depressed parent, parental alcohol abuse, and the like can affect young people—causing depression, substance abuse, and other dysfunction.

Compas has concluded that exposure to stress and adversity affects both psychological and biological components that influence the development of self-regulatory processes. The strengths or limitations of these processes, in turn, affect adolescents' vulnerability to both psychopathology and physical illness. The reactivity and regulatory functions that take place in the brain are key mediators of stress, and they are governed by social context and behavior as well as biology. Thus, interventions—such as the presence or absence of support from parents or other caring adults in a stressful situation—can affect adolescents' capacity to cope with stress by reducing or enhancing certain environmental features or changing the ways in which youth perceive and respond to them. Better and more precise understanding of the sequence and patterns of these connections between the brain and the social environment therefore has the potential to provide the basis for more effective interventions.

SUBSTANCE ABUSE

Substance abuse is another source of significant risk for adolescents. Current patterns illustrate the interactions of biological, behavioral, and social factors that make adolescence risky, as described by Dahl and others. Laurie Chassin opened her presentation on substance abuse in teenagers with a discussion of patterns that characterize the course of substance use and substance use disorders over the life span. Peaks in substance use and disorders occur in the period that is now often referred to as emerging adulthood (ages 18 to 25) while normative declines emerge in the early to mid-20s, with the onset of adult roles. She highlighted some key characteristics of adolescence that have already been discussed: increased sensitivity to immediate rewards, a focus on peers and social rewards, immature inhibitory and self-regulatory processes, increased risk taking and sensation seeking, and difficulty with mood regulation. Adolescents, she added, are increasingly independent of parental control and are also frequently exposed to a variety of stresses, including insufficient sleep, poor diets, and environmental stresses.

Considering these circumstances is important, Chassin pointed out, because substance use is a functional and motivated behavior; that is, it can provide a sense of relief from some of the stresses adolescents experience. However, adolescents seem to respond to substance use in diverse ways. Some young people are more resistant to problems with substance use than others, and, as a group, even those who have problems display significant variance in terms of the age of onset of substance use; the speed with which they escalate the behavior; and their degree of persistence with certain patterns of use and abuse.

Chassin distinguished among two groups of adolescents who develop problems with substance abuse: those who begin the behavior early in the adolescent period and those who begin it late. Chassin demonstrated that the same pattern is evident with cigarette smoking as well as binge drinking.² The early-onset group is characterized by a steep escalation in the behavior once experimentation begins and a high risk for a variety of related problems. The later-onset group is resistant to the behavior until late in adolescence, around the time of leaving home, but addictive behaviors developed at this time nevertheless can persist into adulthood.

Chassin used the early-onset group to illustrate the trajectories that lead to substance abuse and addiction, as well as a broader point about the links among the factors that seem to influence this behavior. Young people who use substances at an early age tend to demonstrate other symptoms of physiological or emotional dysregulation. They are already prone to deviant behavior, and they are high in impulsivity and sensation seeking. They tend to have family histories of substance use disorders, which frequently co-occur with other kinds of family dysfunction, such as discord, divorce, and the like. Thus, Chassin noted, it is possible that early substance abuse is actually a marker for other risks that already exist for a given adolescent, and that the substance use behavior itself is not the primary cause of the child's problems.

Chassin cited Dahl's earlier discussion of the way different factors can spiral to amplify problems for an individual, tipping the balance from positive functioning to dysfunction, in noting the interactions between substance use and other factors. She described one psychosocial spiral in which experimentation with substances leads a young person to associate with a different peer group and perhaps to start failing in school. Coping skills

²Chassin also pointed out that in her brief presentation she was not able to do justice to the important differences in the behavior patterns associated with different substances.

may in turn decline, leading to an escalation of problems and a perception of being overwhelmed or out of control—and to an intensification of substance abuse.

At the same time, some data suggest that adolescence is a time when sensitivity to the effects of some substances may be less intense than it is at other phases of life. Studies of adolescent animals as well as humans indicate that responsiveness to sensory cues to limit intake—such as perceptions of motor impairment or the sedative effects of alcohol—are weaker at this age than at others. Research with animals has suggested, in addition, that adolescents may have greater sensitivity to the reinforcing effects of some substances, such as the sensation of being soothed, stimulated, or relaxed in a social situation. Thus, Chassin explained, a bio- or neuro-psycho-social interaction model could yield greater insight into substance abuse than one that focuses solely on a psychosocial spiral.

Another piece of the puzzle involves family history and family processes. Chassin noted that while these are important protective and risk factors, they are somewhat hidden in many cases, particularly from staff in schools or other programs who may focus solely on the youth's own risk factors. As many as one-fourth of young people are exposed by age 18 to alcoholism in a parent, while nearly 10 percent of children ages 10 to 17 live with a parent who is dependent on drugs or alcohol. Children of alcoholics differ from other children in several ways. They are more likely to have a very early onset of substance abuse and a steep acceleration of the abuse. They are much less likely to show the typical pattern of maturing out of risky substance use as they enter their late 20s. Some evidence suggests that they may be less sensitive than other adolescents to the negative effects of alcohol—and more impervious to cues to stop. In short, they are at a significantly increased risk for clinical substance disorders that persist into adulthood.

Chassin discussed several theoretical models for understanding the role of family factors and processes in the development of substance abuse. In one view, substance use develops as part of a broader spectrum of conduct problems and antisocial behavior. Children of alcoholics, for example, have problems in regulating their own behavior that are exacerbated by a lack of authoritative parenting.³ This lack of self-regulation and failure to respond

³Psychologists and others who study parenting distinguish between authoritative parenting, in which parents make and enforce rules but are supportive and flexible, and authoritarian parenting, in which parents rely on rules and obedience in more arbitrary ways.

to social cues can lead to school failure and to the formation of peer groups that encourage substance abuse. Other views focus on the negative stress that accompanies life with a substance-abusing parent, such as job loss, divorce, and economic and emotional distress—and children’s tendency to seek out alcohol and other substances as a way of coping with that stress.

For Chassin, the various models that may explain substance abuse in children all underline the heterogeneity in the pathways children take to this disorder. There are numerous sources of risk and multiple levels of protective factors, and different children are susceptible to the presence or absence of differences. In other words, to understand substance abuse in adolescents, one must consider both normal development and development that deviates from the norm (psychopathology); one must consider genetic risk as well as the neuroscience of sensitivity to substances; and one must consider socialization and behavior in context. Moreover, one must consider not only the family context, but also the broader cultural context—Chassin pointed out that a study of substance abuse among Mormon families in Utah is likely to look quite different from a study in a more mainstream U.S. setting.

Chassin closed with the point that the three top causes of mortality in adolescents—accidents, homicide, and suicide—are all highly correlated with substance abuse. She noted further that substance abuse is often critical to the tipping point Dahl described—the factor that tips a child from coping moderately successfully to spiraling into real trouble. The methodological challenge is to disentangle the effects of substance abuse from the presence and absence of a large matrix of risk and protective factors in which it is embedded.

DYSFUNCTIONAL RELATIONSHIPS

Another area of significant risk for teenagers involves sexual and other romantic relationships. While extensive research has been conducted on adolescent dating behaviors, little is known about key risk factors, such as violence, that frequently emerge in intimate relationships. Jay Silverman began his discussion with the point that while violence in dating relationships among teens is a serious problem, it has only recently begun to be addressed as a personal health and public health concern. One in four girls by the age of 18 reports having been physically or sexually hurt by a dating partner. Some evidence suggests that girls ages 12 to 16 are the largest demographic group being harmed in this way and that the bulk of the

assaults are by people known to the victim. While evidence in this area is scant, it indicates that dating violence may be a major factor that is largely unaddressed in adolescent health, sexual health, pregnancy, suicide, and substance use programs.

Specifically, Silverman presented data obtained from public health surveillance studies suggesting that girls who experience physical or sexual dating violence are more likely to become pregnant, attempt suicide, smoke, and use illicit drugs. Many have also grown up with abuse and other sources of dysfunction in their families. Several recent studies have indicated that this type of violence is particularly prevalent among lower income teens and in immigrant communities, although the reasons for this discrepancy are not understood. In general, while the data provide some indications of the circumstances of these teenage girls' lives, they shed little light on underlying patterns or causation. Most disturbing, for Silverman, is the fact that the majority of the available data draw on the experiences of the victims of this kind of violence, not the perpetrators, even though it is the perpetrators' behavior that needs to be prevented.

For Silverman, research that can improve prevention and treatment is the most important focus. He argued that integrated theories—those that incorporate findings from a variety of contexts—offer the best hope of illuminating the many factors that contribute to the problem. For this reason, he argued, they also are the most likely to be of use in the design of interventions.

MEDIA INFLUENCES—WHAT ARE THE RISKS?

Ralph DiClemente provided some background for the discussion of risks with a look at some of the effects of exposure to media on teenagers' decision making. He framed the discussion around the basic question of whether life imitates art—whether teenagers are significantly influenced by the images and ideas to which they are exposed. While he noted that relatively little empirical evidence is available to inform public policy, he called attention to some eye-opening findings about teens' exposure to television, music, video games, Internet sites, movies, and other media—drawing a few preliminary conclusions about their influence on young people's thinking and behavior.

First, teenagers' overall exposure to media is significant (see Table 3-1). With regard to television, DiClemente referred to 1998 Kaiser Family Foundation data indicating that more than half of all TV shows contain

TABLE 3-1 Media Exposure of Younger and Older Adolescents

	Younger Adolescents ^b	Older Adolescents ^c	P-value ^d
TV viewing on weekday ^a (hours)	5.15 (3.25)	5.12 (3.52)	0.94
TV viewing on weekend ^a (hours)	20.9 (22.0)	20.3 (24.4)	0.73
TV shows viewed that show women as sex objects ^a (%)	40.3 (25.4)	42.3 (22.5)	0.39
TV shows viewed with heavy violence ^a (%)	60.5 (23.9)	62.9 (23.1)	0.27
TV shows viewed that show men hitting or yelling at women ^a (%)	42.0 (24.7)	43.9 (20.7)	0.37
Exposure to rap music videos per day (hours)	3.75 (3.03)	3.72 (3.48)	0.90
Days per week exposed to rap music videos	4.96 (1.95)	4.84 (2.01)	0.54

^aExcludes exposure to music videos.

^bThe younger adolescent group includes subjects ages 13-16 at baseline.

^cThe older adolescent group includes subjects ages 17-18 at baseline.

^dP-value obtained from independent samples t-test.

SOURCE: DiClemente (2005).

sexual content and that shows containing sexual scenes average more than three per hour.⁴ The percentage of shows containing sexual content that include any mention of possible risks or responsibilities of sexual activity or any reference to contraception or safer sex practices has increased since 1998, although the rate of increase seems to have diminished in recent years; the Kaiser Family Foundation found that in 1998 9 percent contained such references, in 2002 14 percent did, and in 2005 15 percent did (Kaiser Family Foundation, 2005). The Internet is another increasingly popular means of recreation for young people. The current volume of web

⁴A recent update of the Kaiser Family Foundation study finds that 70 percent of television shows contain sexual content (up from 56 percent in 1998) and that among shows that contain sexual content, the number of sex scenes per show now averages 5.0 (up from 3.2 in 1998) (Kaiser Family Foundation, 2005).

sites containing sexually explicit material is difficult to gauge, but DiClemente cited a recent estimate of 400,000—as well as an estimate that as many as 15 percent of teenagers are solicited for sex online by strangers.⁵

Earlier studies about exposure to music videos (circa 1986) showed that teens were watching an average of 30 minutes to 2 hours of music videos daily. Music videos frequently portray violence, substance abuse, and sexually suggestive behavior, DiClemente pointed out, and particular attention has focused on gangsta rap music lyrics and videos, in which women are frequently portrayed as sex objects and in subservient roles.

In a more recent small-scale study of girls (ages 14 to 18), DiClemente and his colleagues (2005) explored the effects of media exposure on teen behavior. They found that 96 percent of participants reported having watched rap music videos and that their average exposure just to rap music was four hours per day. A total of 83 percent of the girls in the study reported that watching the videos influenced the way they dress, while 70 percent reported that the videos influenced the way they behave. These effects were found across the ages studied. Those with the highest exposure to the videos showed the greatest impact on behavior in terms of incidence of having had multiple sex partners, used alcohol, been arrested, hit a teacher, and displayed other problem behaviors.

DiClemente also mentioned an ongoing research project in which he and his colleagues are using security technology to track teenage subjects' Internet use and to establish links between the content of web sites visited and dietary behavior, drug use, antisocial behavior, dating violence, and sexual behavior. DiClemente cautioned that this type of data may help identify associations between exposure to particular kinds of material and high-risk attitudes and behaviors, but that it is not adequate to demonstrate causation. What remains uncertain is the extent to which teens with certain preferences actively seek out media that reflect and reinforce these preferences and the extent to which selected media influences actually create and stimulate teen preferences and behaviors.

The American Academy of Pediatrics already recommends that physicians and parents monitor adolescents' media diets and provide guidance

⁵An earlier report by the National Research Council examined what is known about relationships among youth, pornography, and the Internet (see National Research Council, 2002).

on the timing, location, and content of media exposure, DiClemente pointed out, but he argued that much more can be done. Greater use of industry-wide codes, the creation of alternative music videos and video games with more positive content, and the development of prosocial strategies can all help inoculate teenagers against the negative messages to which they are exposed. Further research to better define the associations among media exposure, high-risk behavior, and adverse health outcomes is clearly needed, DiClemente argued. The larger point was clear, however: the vast majority of teenagers are exposed to a heavy diet of television, music, video games, and other media that contain violence, sexual situations, and other high-risk behaviors, and not enough is known about how the duration, intensity, timing, or content of exposure affects them.

CONCLUSION

These observations about the causal influences and associations with problem behaviors that influence adolescent health and development led to further discussion about positive influences and preventive strategies that can support positive trajectories and diminish negative risks and disorders. The workshop participants suggested that it would be helpful to understand more about the relationships among increased supports (such as connectedness with family and communities), youth engagement with school and social groups, and positive outcomes or absence of negative outcomes. These issues helped to frame the discussion in the following chapter, which focuses on the theory of positive development and the importance of opportunities and social settings in adolescent health and development.

4

A Time of Opportunity

Although much attention in prior years has focused on adolescent risks and problem behaviors, more recent research is directed toward interactions that are associated with positive health and development. Longitudinal studies such as the Adolescent Health Survey have highlighted the importance of such constructs as youth engagement, connectedness, and decision-making processes, which are now attracting increased interest by researchers and practitioners involved in the design of prevention and health promotion interventions (Centers for Disease Control and Prevention, 2003). As Ron Dahl put it, adolescence is “a time when kids become passionate about ideas and about ideals—[they can] become passionate about a sport, or music or literature or dance or changing the world.” Thus adolescence is a time to capture and channel kids’ passions and emotions toward constructive activities and relationships. This perspective on adolescents has been the guiding principle for many programs designed to engage teenagers, head off problems, build skills, and create settings that connect youth with caring adults who can help them cope with stresses that pose risks to their health and well-being.

POSITIVE YOUTH DEVELOPMENT

The approach known as positive youth development is based on the conviction that while adolescents face risks and experience stress and trauma, a problem-centered approach may not be adequate or sufficient to help them navigate this time of life and grow into successful, productive

adults. The point is not to ignore the importance of prevention strategies or the need for intervention and treatment with troubled adolescents, but rather to develop a broader framework that serves their needs and promotes positive outcomes for all young people, not just those who are already in trouble. Examples of programs that incorporate this approach include mentoring, school-based community service programs and other volunteer programs, school-to-work transition activities, and programs for arts, recreation, and the development of parenting skills (National Research Council and Institute of Medicine, 2002).

The positive youth development approach represents a significant departure from earlier conceptions of adolescence, as Richard Lerner explained in a presentation that explored shifts in thinking over the past century as well as current links among theory, practice, and policy. Lerner grounded his discussion of phases in thinking about adolescence in the context of changing theoretical paradigms regarding human development over the entire life span. He pointed to the work of William Overton, who moved the field from a focus on the “nature versus nurture” dichotomy to the current conception of development as a process in which multiple levels of organization—ranging from the inner biological through the psychological to the physical, ecological, sociocultural, and historical—all play a role.

Pioneering studies of adolescence actually predate the nature versus nurture dichotomy. G. Stanley Hall, who published the first textbook on adolescence in 1904 (Hall, 1904), concurred with his contemporaries in viewing human development as a mirror of the evolutionary history of the species, in which humans evolved from beast-like to civilized persons. Adolescence, he argued, was the period during which young people needed to overthrow their beast-like impulses and become mature and civilized. This struggle accounted for the “storm and stress” characteristic of these years.

As Lerner explained, this deficit model—or focus on the upheavals and risks of the adolescent years—dominated research on adolescence throughout the first half of the 20th century even as researchers moved beyond many of the specifics in Hall’s thinking. By the 1960s, researchers began to question whether stress and disruption were universal elements of adolescence. Many young people do not experience the second decade of life as stormy, they value their relationships with their parents very much, their core values frequently are consistent with those of their parents, and they generally select friends who share those core values. Individual differences in the ways young people respond to challenges, including the concept of resiliency, began to emerge as a more important focus.

Nevertheless, research continued to focus on tackling problems that resulted from the deficits associated with adolescents, such as alcohol abuse, unsafe sex and teenage pregnancy, crime and delinquency, and others. Beginning in the 1990s, a number of researchers began to rethink this approach. While not ignoring the consequences of the observation that an estimated 50 percent of adolescents have problems in at least one of the four primary categories (teenage pregnancy and parenting; unsafe sex; alcohol use and abuse; and school underachievement, failure, and dropout), Lerner explained, these researchers explored the implications of the interrelated systems model of human development for adolescence.¹

At the same time, practitioners began to achieve significant success with programs based on young people's positive potential, rather than their tendency to get into trouble. In exploring the sources for these programs' success, Lerner explained, the academic community proposed some theoretical foundations to help explain and interpret practitioners' observations. The theoretical basis for positive youth development is developmental regulation, a view of the ways in which individuals seek to integrate the many levels that influence development, from the biological to the sociocultural. In this view, the unit of analysis is the bidirectional linkage between the individual and the context, and the twin goals are to understand both differences in a single individual over time and differences across many individuals at the same time.

Lerner argued that new research designs and measures are necessary to adequately explore these differences. He identified the need for measures in longitudinal and sequential study designs that can examine physiological change while also taking into account such factors as generation and historical change; subgroupings by gender, race, ethnicity, and religion; and such contexts as family, community, culture, and urban/rural setting. In other words, he explained, efforts to combine qualitative and quantitative data could help researchers capture the complexity of the adolescent experience.

This emphasis on diversity provides the basis for examining the circumstances in which the potential exists for change and for positive inter-

¹The 50 percent figure is subject to some dispute. A summary of Centers for Disease Control and Prevention data on adolescent health risks provides additional information on the statistical prevalence of a range of risks, supporting the general observation that many youth experience a variety of risks (Centers for Disease Control and Prevention, 2004).

vention, rather than focusing solely on the near-inevitability of dysfunction. Thus, the key facets of the positive youth development approach are

- emphasis on youth strengths and the promotion of positive development;
- belief that all youth have the potential to develop positively;
- recognition that youth are embedded in families, schools, and communities that can nurture or impede their development;
- recognition that both youth and their ecologies are active contributors to the developmental process; and
- belief that aligning the strengths of youth with the resources for healthy development present within their ecologies can promote positive development.

These facets provide a way of replacing the deficit view of adolescence with a view that all adolescents have strengths. The “five Cs” identified in the NRC report *Community Programs to Promote Youth Development* (National Research Council and Institute of Medicine, 2002)—competence, confidence, character, caring, and connection—have been proposed as a way of focusing on the contributions young people can make, and these now provide the basis for many youth programs. Successful positive youth development programs, Lerner explained, have three major characteristics. They promote caring youth-adult relationships, they emphasize the development of life skills, and they promote youth participation in every aspect of the program.

Lerner described some approaches to testing the theoretical underpinnings of positive youth development and evaluating the effectiveness of programs based on this approach. He acknowledged that the relationship among theory, research, and application regarding positive youth development is just getting under way and that more rigorous efforts are needed to identify key variables and processes. To make this connection concrete, Angela Diaz described the work of the Mt. Sinai Adolescent Health Center in New York City, a program that uses the positive youth development approach in serving the health needs of 15,000 adolescents annually.

A SAFETY NET FOR NEW YORK CITY’S YOUTH

The population of New York City includes large numbers of low-income young people who lack adequate health insurance and who face the

challenges of adolescence in a context that can be stressful and sometimes dangerous. The Adolescent Health Center run by Mt. Sinai Hospital in Manhattan provides this population with physical, mental health, and reproductive health care in a way that integrates prevention and positive youth development. As Diaz explained, it would be easy to focus exclusively on prevention when working with these young people: 98 percent of them are poor, and 76 percent have no health insurance. In the youth population that is served by the center, for example, 71 percent have witnessed violence, 37 percent have been victims of violence, 30 percent have been sexually abused, and 25 percent have been threatened or assaulted with a weapon.

Nevertheless, the program uses a “learner’s permit” approach to adolescent health, in which adolescents are treated as partners in their care who need guidance to improve their decision-making skills and to gain competence and a sense of mastery over their situations. The goal for staff is to identify and draw on each child’s strengths and experiences, take their perspectives seriously, and offer them the option of a supportive relationship. In this way, the center addresses the need for psychological and physical safety, but also involves the children in decision making about their care, as well as in responsibility for exploring resources in their local environments.

The center deals with a high rate of problems, such as easily available drugs and substance abuse, the psychosocial effects of violence in schools and communities, and unplanned pregnancies and sexually transmitted diseases. Yet it considers its primary focus to be the promotion of positive outcomes, as opposed to the triage of problems. Health care appointments are used as opportunities to gain teens’ trust, provide a safe environment in which they can air concerns and questions, and build such skills as regulating emotions, health risk management, and critical thinking.

Diaz explained that young people frequently are eager to talk and ask questions about their experiences, and that simply asking in a non-judgmental way is often enough to open the door for intervention and education. At the same time, the center offers young people a variety of positive ways to be involved and to take on a sense of responsibility for others, including service on a youth advisory group that participates in evaluation of the center’s work, involvement in the design of center materials to ensure that they will be accessible and meaningful to their peers, and employment at the center to help with peer health education.

Diaz noted that many adults are resistant to the idea that young people should have the degree of autonomy over their health care that is encour-

aged at the center. She explained that while some research has provided evidence of the effectiveness of programs that operate according to this model in reducing problem behaviors and promoting positive ones, more studies are certainly needed. In particular, opportunities to combine this framework with cross-disciplinary research focusing on biological markers and neurobehavioral systems could provide great benefit in testing the model's efficacy and effectiveness with selected groups.

LINKING RESEARCH TO INTERVENTION

The discussion of Mt. Sinai's program for adolescents provided an important reminder of the immediate need for strategies that work with young people by influencing their decision-making processes, their selection of friends and social networks, and their engagement with health care professionals, teachers, and other service providers (see Box 4-1 for an illustrated example focusing on the development of a vaccine for the human papillomavirus).

Brian Flay offered a comprehensive attempt to link research-based theories of adolescent behavior with intervention strategies. Flay's model, based on a theory of triadic influence, reinforces much of the workshop discussion about the interactions among factors that affect adolescents. The basic model structure is illustrated in Figure 4-1. The first element of the model is that both behavioral choices and development are influenced by a complex system of genetic and environmental factors that act through three streams of influence. These three streams are intrapersonal or psychological, interpersonal or social, and sociocultural or attitudinal influences on action. At the same time, the three streams are affected by both cognitive and affective influences.

Each area of influence has the potential to increase or reduce both risk factors and protective factors. For example, a negative sense of self can increase risk, while a positive sense of self can serve as a protective factor. For an adolescent growing up in a disadvantaged community, a negative community or family influence can increase the effects of a poor sense of self if other supports are not available. This type of analysis calls attention to the factors that contribute to the formation of self-identity and opportunities to intervene in these fundamental processes. The feedback loop is an important dynamic in this model. Once a behavior, such as trying marijuana, occurs, the reaction—changes in thoughts or feelings, relationships with parents—feeds back and influences the original causes of the behavior.

Box 4-1 Influences on Adolescent Decision Making— The HPV Vaccine

The complexity of influences on adolescents' thinking is of more than academic interest for many reasons. One context in which understanding how adolescents make decisions is particularly important is that of health care. Jessica Kahn described the benefits of a new vaccine for human papillomavirus (HPV)—a common sexually transmitted infection that can cause severe health problems, including cervical cancer. She used that example to frame questions about the influence of contextual factors on adolescent decision making about health issues (Kahn, 2005).

The HPV vaccine, which is likely to come on the market soon, has the potential to protect young women and their sexual partners from serious health problems, but it poses several public health challenges. First, the vaccine will be most effective if it is administered prior to first sexual contact. Parental consent is likely to be required for administration of the vaccine to young people under age 18, and many parents may be reluctant to address the issue with their children, or they may be concerned that by allowing the vaccine they would signal an expectation that their children will be sexually active.

At the same time young people themselves may misunderstand the protections the vaccine affords and perhaps develop a false sense of protection from other risks associated with sexual activity. Young people who interact with the health care system without the guidance of a parent may not adhere to a vaccination schedule (multiple doses may be necessary) or return for follow-up Pap screenings (the vaccine is not 100 percent effective).

The potential benefits of the HPV vaccine, Kahn explained, are affected by parental attitudes, interactions between parents and their children, peer attitudes, relationships with the health care providers, and other factors. For the vaccine to have the maximum benefit—and it, together with Pap testing and HPV screening, could prevent virtually all cervical cancer deaths—adolescents, parents, and health care providers will all need education that is developmentally, linguistically, and culturally suitable. Theoretical approaches to adolescent decision making, as well as further explorations of additional contextual factors—such as individual, organizational, cultural, and socioeconomic factors—could all assist public health professionals in supporting the successful adoption of the vaccine. Such a success, and the research that could support it, could in turn be beneficial for other public health issues in which adolescent decision making plays a part.

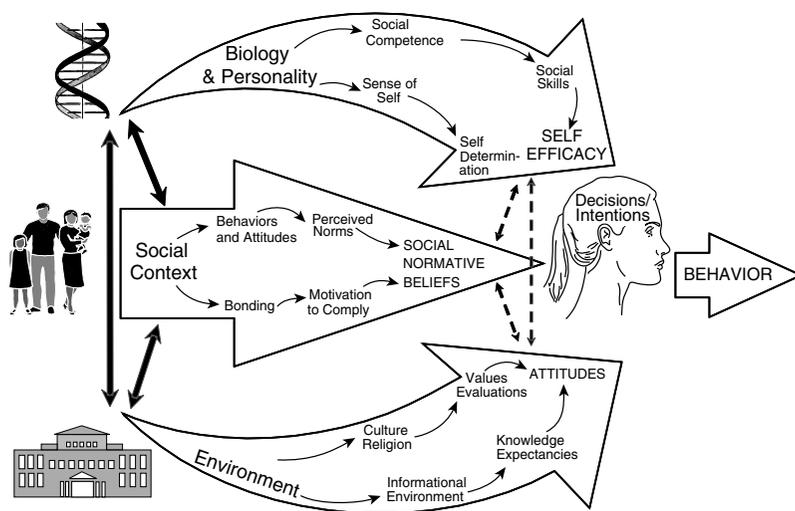


FIGURE 4-1 The basics of the theory of triadic influence.
SOURCE: Flay (2005).

At the same time, related behaviors, such as smoking and drinking, have similar causes, so the feedback loop may influence these other behaviors as well.

Flay links the major causes of risky behaviors to the three primary streams of influence, and in turn reasons for changing behavior, and intervention strategies, as shown in Table 4-1.

He identified a number of implications from this model for intervention and prevention strategies. First, the model illustrates why approaches that address only one stream of behavior are not likely to succeed. A program that simply provides information, for example, or focuses solely on values or the development of resistance skills, does not address the range of factors that influence the behavior in question. Flay did not argue for dropping traditional approaches, but rather he advocated for broader approaches that can be sustained after the intervention has ended.

A program that taps the potential in each of the three main categories is far more likely to be successful. It might incorporate family involvement and the teaching of parenting skills as well as the teaching of a variety of skills to teenagers that affect their self-image as well as their social skills and views of the risky behavior. At the same time, sociocultural influences could be tackled to reduce the risks that youth encounter in their social settings.

TABLE 4-1 Major Reasons for Doing Risky Things and Corresponding Reasons for Behavioral Change and Behavioral Change Strategies

Streams of Influence	Reasons for Doing Risky Things	Reasons for Behavioral Change	Behavioral Change Strategy
Sociocultural, attitudinal	It makes me feel good; it's good for me	It will be good for me; to gain benefits or avoid negative consequences; to improve myself (health) in ways I value	Information: make benefits salient and visible Values clarification: make goals/improvements clear
Social	Others want me to; it's what others expect of me; everyone else is doing it; to gain social acceptance	Others want me to; it's what others expect of me; everyone else is doing it; to please others	Modeling/demonstrating behavior Social reinforcement/support
Intrapersonal	I don't know how not to or how to change; things remind me of it (cues); I can't help myself	I am confident that I can do it; I think I have the skill to do it; I have the will to do it	Teach/learn/practice skills Build in prompts, cues, reminders

SOURCE: Flay (2005).

Examples include limits on the sales and advertising of alcohol and tobacco products to minors and other measures such as the placement of social marketing, prevention, and health promotion strategies in the environments of youth.²

²One recent report that has advocated a comprehensive strategy to address underage drinking is the study *Reducing Underage Drinking: A Collective Responsibility* (National Research Council and Institute of Medicine, 2004). Another example of environmental forces that influence adolescent health decision making is addressed in the study *Food Marketing to Children and Youth: Threat or Opportunity?* (Institute of Medicine, 2006).

What Next for Research on Adolescence?

The September 2005 workshop demonstrated that many fields are actively contributing to and expanding the knowledge base regarding adolescent health and development. Research findings are emerging in multiple fields, many of which were represented in the workshop—including psychology and human development, psychiatry, biological psychiatry, behavioral and brain development, neuroscience, pediatrics and internal medicine, adolescent medicine, community medicine, epidemiology and statistics, infectious disease and immunology, sociology, education, and the law. The participants identified many opportunities to link these fields within a developmental framework and to apply this knowledge base to policy and practice. They were also mindful of the many areas of research that could not be represented during the short workshop but that are equally relevant.

The key objective for the workshop was to consider the question of whether the time is right for a comprehensive synthesis of the diverse array of research findings that are contributing to an understanding of adolescence. The principal questions to be considered, as Trina Anglin suggested in her opening remarks, were whether there is an adequate, cumulative knowledge base, and whether an effort to synthesize this base would help researchers and policy makers take stock of what has been established, plan future directions, and inform policy and practice.

The five objectives for the workshop (listed in Chapter 1) provided a framework for consideration of this issue. The workshop sessions high-

lighted several emerging fields of research and identified a number of promising areas for further study. Participants also explored the differences among the theoretical and developmental frameworks that govern different kinds of research—and these differences were identified as a key impediment to the kinds of synthesis and cross-fertilization that are needed. In several contexts participants noted that connections between research and the needs of practitioners and others who work with teens are insufficient, yet badly needed. Each of these points contributed to a shared sense of the urgent importance of finding ways to synthesize and apply existing and developing knowledge.

Many speakers recognized the formidable challenge that was inherent in producing a synthesis of the diverse body of research on adolescent health and development, if only because of the significant variations in the theoretical models that characterize these fields. Dennis Bier spoke, for example, about the gaps between the conceptual approaches characteristic of biological and social sciences, using evident contrasts among some of the models that were presented. For example, models that are descriptive and qualitative may capture important but poorly understood complex processes, whereas models that are quantifiable and can be described mathematically offer a basis for experimental tests. He noted that some of the descriptive models presented at the workshop were quite complex and did not readily lend themselves to experimentation with the scientific methods characteristic of his own field, isotope kinetic modeling. In many cases, he pointed out, researchers in different fields may not even use common terms or understand commonly used terms in the same way.

Bier suggested that the possibilities for linking behavior, biology, and social context are intriguing and promising. Nevertheless, he pointed to what might be viewed as the two ends of a continuum that ranges from qualitative research focused on such concepts as competence and connectedness to quantitative research, such as that done in molecular biology, with its breakthroughs regarding inaccessible regions of the brain, hormonal processes, and the use of techniques such as functional magnetic resonance imaging (MRI) and positron emission tomography (PET) scanning. His concern was with the absence of an overarching framework that would help reconcile very different methodological approaches and standards of evidence.

Ron Dahl, in contrast, pointed out that the study of adolescence has been interdisciplinary from the start, as the title of the foundational 1904 text by G. Stanley Hall demonstrates: *Adolescence: Its Psychology and Its*

Relations to Physiology, Anthropology, Sociology, Sex, Crime, Religion, and Education. Today, Dahl argued, despite persistent efforts to establish transdisciplinary links, numerous disciplines continue to publish in different journals and operate within different frameworks, creating a fragmented and piecemeal clinical picture for adolescents, their families, and those who care for them. A child with attention deficit hyperactivity disorder, depression, or a sleep problem, for example, might go to a pediatrician, a developmental pediatrician, a behavioral pediatrician, an adolescent medical specialist, a neurologist, or a child psychiatrist, to name just some of the possibilities. Depending on which kind of practitioner the child sees, the treatment response might vary significantly.

The fragmentation is evident at other levels as well. It can be detected in the kinds of empirical support that are mustered for various interventions, the performance standards used to evaluate selected programs, and the processes through which researchers apply for grant funding to support their work. Dahl argued that this fragmentation is counterproductive because few structures are available that encourage and enable researchers to stay informed about developments in other fields that might offer important implications for their own work. Dahl and others highlighted the opportunities that could emerge from developing connections among multiple research fields, both those that already exist and those that need to be developed and fostered. To that end, a comprehensive research synthesis that examines some primary existing lines of research—the contributions they are making and the actual and potential links among them—could help stimulate the research agenda in ways that will make it more valuable to practitioners, policy makers, and researchers. From Dahl's perspective, adolescence requires a transdisciplinary framework because it begins in biology (the physical changes associated with puberty) but it really ends in social context (the assumption of adult roles).

While a detailed discussion of the feasibility and design of any particular study approach was beyond the scope of the workshop, many participants cautioned against attempting to cover the whole waterfront at once. A comprehensive study that tried to look across all the possible dimensions might be overwhelming, while a focused study that addressed unique problems and opportunities to intervene with adolescents could bring coherence to a scattered array of relevant research studies. These types of integrated snapshots could help the field make an important move forward. A more focused study might also provide a model for integrating selected fields that could be applied in other contexts. For example, Dahl noted that

discussions throughout the workshop touched on processes related to inhibitory control, social monitoring, and regulatory capacities that adolescents lack. Neural development, social development, skill development, and other processes all relate to these functions, and many types of research can contribute to a fundamental understanding of the nature and expression of these interactions. Thus, developing a synthesis of just the work relevant to this field alone might pose a manageable challenge. The influence of media on diets, learning processes, social relationships, and other behaviors is another area about which complex questions can be asked in a variety of domains—and which could also serve as the focus of a study that explored the possibilities for transdisciplinary research.

In closing remarks, Robert Blum reiterated a view expressed in different ways throughout the workshop—that new conceptual models are needed to explain the boundaries and frontiers of adolescence and to offer opportunities to strengthen scientific investigations of underlying processes. He suggested that such models could help establish parameters that would enable researchers from different traditions to communicate and improve opportunities for collaboration. An integrated model of adolescence—a definition of the subject of study—that was able to incorporate the contextual, social influences on young people as well as neuroscience, cognitive, and behavioral research and other experimental research might also reduce some of the obstacles that now limit the explanatory power and applicability of findings. At the same time, he cautioned that because funding streams tend to focus on problem behaviors, those fields of study are likely to continue to dominate the study of adolescence until more powerful theoretical and developmental frameworks emerge.

While some participants pointed out that an integrative model that encompasses this entire terrain may be too ambitious, a synthesis that could systematically identify areas in which congruence is possible could nevertheless be of real importance. Gail Slap drew on two comments that seemed worlds apart—one about the importance of religiosity and spirituality in adolescents' lives and another about hormones—to make the point that the challenge is to think about how religiosity might interact with neurohormonal effects and to develop a framework in which such questions are likely to be asked.

Taking that point another step, Dennis Bier observed that the classical study of hormones has given way to a realization that “every organ knows what every other organ is doing, because they each have a series of hormones.” Thus, the chemical and biological connections used by the brain

to process biological functions, environmental influences, emotional and sensory impulses, and other stimuli are just now being recognized as far more complex than had been realized. Any phenomenon—sleep, decision making, diet, or appetite, for example—could be studied as a way of illustrating these complex connections.

Participants offered a variety of candidate topics that could serve as the focus for a synthesis study, if it were tackled in steps, rather than as an effort to integrate the entire universe of research relevant to adolescence. At the same time, however, few were willing to abandon the hope of a basis for improved coordination and integration among multiple fields. The point was made repeatedly, in different ways, that research-based conclusions are most useful in practice when they reflect an integrated understanding of what is going on with teenagers, those at risk or engaged in risky or problem behaviors as well as those who are resilient in resolving or avoiding such behaviors.

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Appendix

Workshop Agenda and Participants List

Workshop on the Synthesis of Research on
Adolescent Health and Development
September 8-9, 2005
The National Academies Keck Center
Washington, DC

Thursday, September 8

- 8:30 am Welcome and Introductions—Discussion of Workshop
Purpose and Goals
Dennis Bier, Baylor College of Medicine
Robert Blum, Johns Hopkins University
Rosemary Chalk, Board on Children, Youth, and Families,
The National Academies
Trina Anglin, Office of Adolescent Health, HRSA/MCHB
- 8:45 am **Session 1** (*moderator: Dennis Bier*)
Brain Biology, Pubertal Maturation, and Adolescence:
New Insights from a Developmental Framework
Ron Dahl, University of Pittsburgh
Elizabeth Shirtcliff, University of Wisconsin

10:15 am Break

10:30 am **Session 2** (*moderator: Richard Bonnie, University of Virginia*)
Lessons about Risk and Resilience from Studies of Adolescent Health: The Intergenerational Transmission of Health Behaviors and Disorders
Laurie Chassin, Arizona State University
Brian Flay, University of Illinois at Chicago
Ronald Kleinman, Massachusetts General Hospital
(*discussant*)

Noon LUNCH

1:00 pm **Session 3** (*moderator, William Beardslee, Children's Hospital, Boston*)
The Impact of Biology, Puberty, Stress, and Developmental Transitions on Mental Health and Mental Disorders
David Brent, University of Pittsburgh
Daniel Pine, National Institute of Mental Health
(*discussant*)
Bruce Compas, Vanderbilt University (discussant)

3:00 pm Break

3:15 pm **Session 4** (*moderator: Heather Johnston Nicholson, Girls Incorporated*)
Health Decision Making During Adolescence: Contextual Influences from Family, Dating Relationships, Health and Social Settings
Jessica Kahn, Children's Hospital Medical Center of Cincinnati
Jay Silverman, Harvard School of Public Health
(*discussant*)
Ralph DiClemente, Rollins School of Public Health
(*discussant*)
Robert Blum, (discussant)

5:00 pm Adjourn

Friday, September 9

8:30 am **Session 5** (*moderator: Milbrey McLaughlin, Stanford University*)
Understanding and Enhancing Adolescent Health and
Development
Richard Lerner, Tufts University
Angela Diaz, Mt. Sinai School of Medicine (discussant)

10:30 am **Session 6** (*moderator: Milbrey McLaughlin*)
Next Steps—Framing a Long-Term Study on the Science of
Adolescence
Robert Blum
Ron Dahl
Dennis Bier

General Discussion

Concluding Remarks

PARTICIPANTS

- Trina Anglin, Chief, Office of Adolescent Health, Maternal and Child Health Bureau, Health Resources and Services Administration, Rockville, MD
- Sweena Aulakh, Public Health Analyst, Office of Adolescent Health, Maternal and Child Health Bureau, Health Resources and Services Administration, Rockville, MD
- William Beardslee,* George P. Gardner and Olga E. Monks Professor of Child Psychiatry, Harvard University, and Department of Psychiatry, Children's Hospital, Boston
- Alexandra Beatty (*Rapporteur*), The National Academies, Washington, DC
- Brenda Benesch, Research and Policy Analyst, Children and Youth Policy Division, Office of the Assistant Secretary for Planning and Evaluation, U.S. Department of Health and Human Services, Washington, DC
- Dennis Bier (*Chair*),* Professor of Pediatrics and Director, Children's Nutrition Research Center, Baylor College of Medicine
- Robert Blum,* William H Gates Sr. Professor and Chair, Bloomberg School of Public Health, Johns Hopkins University
- Richard Bonnie,* John S. Battle Professor of Law and Director, Institute of Law, Psychiatry, and Public Policy, University of Virginia
- David Brent, Academic Chief, Child and Adolescent Psychiatry, Endowed Chair in Suicide Studies, Professor of Psychiatry, Pediatrics and Epidemiology, University of Pittsburgh School of Medicine, Director, Services for Teens at Risk, Western Psychiatric Institute and Clinic, Pittsburgh
- Jennifer Brooks, Social Science Research Analyst, Child Outcomes Research and Evaluation, Office of Planning, Research, and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services, Washington, DC
- Rosemary Chalk (*Project Director*), Director, Board on Children, Youth, and Families, The National Academies, Washington, DC
- Laurie Chassin, Professor, Department of Psychology, Arizona State University

*Members of the program committee.

- Bruce Compas, Patricia and Rodes Hart Professor, Department of Psychology and Human Development and Department of Pediatrics, Vanderbilt University
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- Deborah Delgado,* Senior Associate, Annie E. Casey Foundation, Baltimore
- Angela Diaz, Professor of Pediatrics and Community Medicine and Director, Mt. Sinai Adolescent Health Center, Mt. Sinai School of Medicine, New York
- Ralph DiClemente, Charles Howard Candler Professor, Rollins School of Public Health and Department of Pediatrics (Division of Infectious Diseases, Epidemiology, and Immunology), Emory University School of Medicine
- Paula Elbirt, Programme Executive, Disadvantaged Children and Youth Programme, The Atlantic Philanthropies, New York
- Vivian Faden, Deputy Director, Division of Epidemiology and Prevention Research, National Institute on Alcohol Abuse and Alcoholism, Bethesda, MD
- Brian Flay, Distinguished Professor, Institute for Health Research and Policy, University of Illinois at Chicago
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- Becky Judd, Youth Development & Resiliency Specialist, Community Prevention Programs, Division of Behavioral Health, Alaska Youth Services, Anchorage
- Jessica Kahn, Division of Adolescent Medicine, Children's Hospital Medical Center of Cincinnati
- Woodie Kessel, Assistant Surgeon General, Deputy Director for Medical and Health Science, and Senior Child Health Science Advisor, Office of Disease Prevention and Health Promotion, Office of Public Health and Science, Office of the Secretary, U.S. Department of Health and Human Services, Rockville, MD

- Michele Kiely, Chief, Collaborative Studies Unit, Division of Epidemiology, Statistics and Prevention Research, National Institute for Child Health and Human Development, U.S. Department of Health and Human Services, Rockville, MD
- Ronald E. Kleinman,* Professor of Pediatrics, Harvard University and Chief, Pediatric Gastroenterology, Pediatric GI/Nutrition, Massachusetts General Hospital, Boston
- Suzanne Le Menestrel, National Program Leader, Youth Development Research, National 4-H Headquarters, Cooperative State Research, Education and Extension Service, U.S. Department of Agriculture, Washington, DC
- Richard Lerner, Bergstrom Chair in Applied Developmental Science, Tufts University
- Minda Lynch, Branch Chief, Behavioral and Cognitive Sciences Research Branch, National Institute on Drug Abuse, National Institutes of Health, Bethesda, MD
- Milbrey McLaughlin,* David Jacks Professor of Education and Public Policy, Stanford University School of Education
- Peggy McManus, Director, Maternal and Child Health Policy Research Center, Washington, DC
- Elena Nightingale, Scholar in Residence, Institute of Medicine, The National Academies, Washington, DC
- Heather Johnston Nicholson,* Director of Research, Girls Incorporated, National Resource Center, Indianapolis
- Mary Ellen O'Connell, Senior Program Officer, Division of Behavioral and Social Sciences and Education, The National Academies, Washington, DC
- Deborah Olster, Senior Advisor, Office of Behavioral and Social Sciences Research, National Institutes of Health, Bethesda, MD
- Daniel S. Pine, Chief of Section on Developmental and Affective Neuroscience and Chief, Child and Adolescent Research Mood and Anxiety Disorders Program, National Institute of Mental Health, Bethesda, MD
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Board on Children, Youth, and Families

The Board on Children, Youth, and Families (BCYF) was created in 1993 under the joint aegis of the Institute of Medicine (IOM) and the National Research Council (NRC) and serves as the focal point for authoritative analysis of child and family issues relevant to scientific research and policy decisions. The Board brings a developmental and evidence-based perspective to bear on the formation of policies and programs for children, youth, and families, drawing upon the collective knowledge and analytic tools of the behavioral, biological, health, and social sciences. The Board also fosters the recognition that children, adolescents, and families constitute unique populations whose important differences are often not addressed in research studies, public policy and program development discussions, or the organization and financing of health and human services.

The Board is a joint collaboration between NRC and IOM, the only such joint structure that combines the behavioral, social, and health sciences within The National Academies complex. BCYF activities are inherently interdisciplinary and frequently involve collaboration with other major NRC and IOM divisions. From 1997 to 2005, adolescent concerns were addressed initially through a separate Forum on Adolescence, followed by a separate standing Committee on Adolescent Health and Development (CAHD). In March 2005, CAHD was dissolved and its portfolio of activities was integrated into the BCYF agenda.

BCYF engages in work that is both *responsive* and *anticipatory*: responsive to government's and other stakeholders' priority interests; and

anticipatory of scientific discoveries that pose long-term opportunities and challenges in the lives of children, youth, and families. The Board convenes distinguished research scientists, experienced service providers, policy analysts, and community leaders to examine the implications of new research findings and scientific theories in addressing significant issues in health, education, and social policy that affect the well-being of children, youth, and families.

Through studies, reports, workshops, websites, and other activities, the Board informs public and private deliberations about the most critical issues facing communities, states, and our Nation: child and adolescent health and health care services; family support, child care, and early child development; biological and behavioral changes among children and youth; parental health, caregiving, and child health; school engagement and youth development; child abuse, family violence, and child welfare; and the prevention of underage drinking, teen motor vehicle crashes, and other risky and dangerous behaviors. Most of these activities are developed through guidance from separate ad hoc committees appointed to bring relevant expertise to the task at hand. These activities are developed with an emphasis on research findings, evidence-based analysis, consideration of systemic and environmental factors, and attention to strategic planning that can integrate multiple interests.