ADOLESCENT DEVELOPMENT:
Pathways and Processes of Risk and Resilience

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INTRODUCTION

The close of the twentieth century represents both the best of times and the worst of times for adolescents. The lay public and health professionals have gradually changed their views of adolescence from a time of inherent stress and storm to one of opportunities for growth and positive development (e.g. Feldman & Elliott 1990, Millstein et al 1993, Petersen 1988). Youth in many countries throughout the world, especially Eastern Europe, have the opportunity to grow up in and contribute to democratic societies that were unimagin-

able less than a decade ago. In stark contrast, the lives of large segments of today's adolescents in the United States and worldwide are threatened by violence, disease, poverty, and limited opportunities for the future. This is the challenging context for the psychology of adolescence—one of opportunity and of enormous responsibility.

A similar contrast can be found in the juxtaposition of research on adolescence and the status of adolescents themselves. The recent history of research and theory on adolescent development has been characterized by rapid growth. Evidence of the vitality of a psychology of adolescence is reflected in a variety of indicators, including the continued growth of a strong interdisciplinary scientific society (the Society for Research on Adolescence), the presence of several scientific journals devoted specifically to the topic (e.g. *The Journal of Research on Adolescence, The Journal of Youth and Adolescence, The Journal of Adolescent Research*), increased interest in this area from other scientific and professional groups (e.g. the Adolescent Medicine branch of the American Medical Association), the allocation of resources from several major foundations (e.g. the Carnegie Corporation of New York, the Johan Jacobs Foundation, the MacArthur Foundation, the William T. Grant Foundation), and concern for the well-being of adolescents expressed at the level of national policy (e.g. Dougherty 1993, United States Congress/Office of Technology Assessment 1991).

Paradoxically, the robust growth of a psychology of adolescence has been accompanied by a decline in the overall well-being and health status of adolescents. Although morbidity rates for most other age groups have declined in recent decades, adolescent morbidity has increased (Hamburg 1992). The challenges faced by today's youth are reflected in a host of problems, including adolescent suicide (Garland & Zigler 1993), depression (Petersen et al 1993), violence and death due to violence (Earls et al 1993, Hammond & Yung 1993), unplanned pregnancy (Brooks-Gunn & Paikoff 1993), substance abuse (Leventhal & Keeshan 1993), and sexually transmitted diseases (Brooks-Gunn & Paikoff 1993). Further evidence that problems of adolescence are on the rise comes from longitudinal research indicating that rates of emotional and behavioral problems of adolescents (and children) have increased over the past ten years (Achenbach & Howell 1993).

This review highlights recent developments in theory and research methods and summarizes exemplary research findings that contribute to our understanding of psychological development during the second decade of life. We begin by identifying three important themes in research and theory on adolescence: (*a*) the emergence of broad integrative models of adolescent development that include psychological, biological, social, and contextual factors; (*b*) the identification of developmental pathways or trajectories during adolescence that are linked to prior growth during childhood and subsequent adult

development; and (c) the investigation of risk and protective processes that distinguish adaptive and maladaptive developmental paths in the face of adversity. We then offer a critical analysis of these themes by examining their contributions to the understanding of two important problems during adolescence—depression and aggression or antisocial behavior. Finally, we identify directions for future research that will both enhance our understanding of the nature of adolescent development and contribute to improving the quality of the lives and development of adolescents now and in the future.

EMERGENT THEMES IN THEORY AND RESEARCH ON ADOLESCENCE

As any area of scientific inquiry moves toward maturity, there is an inevitable convergence of separate lines of thinking and research. Investigators and theorists who are engaged in particular lines of study discover cross-cutting themes in their work, yielding increasingly more integrative and comprehensive models and methods than those that existed separately. There are a number of indicators that such a convergence has occurred in research on adolescent development (Zaslow & Takanishi 1993).

Models of Adolescent Development: Transactional, Interdisciplinary, and Contextual Approaches

Early attempts to conceptualize the psychology of adolescence took the form of rather straightforward main effects models. These approaches attempted to understand the significant characteristics of adolescent development as a direct function of either intrapsychic (e.g. Freud 1958), biological (e.g. Hall 1904, Kestenbaum 1968), or environmental factors. Recent attempts to conceptualize psychological development during adolescence have reflected a fundamental shift to more interdisciplinary and transactional models. We have selected three recent examples of emerging models of adolescent development that illustrate this broad perspective.

BIOPSYCHOSOCIAL MODELS   Human development and behavior unfold simultaneously on multiple levels. Physical and biological maturation, including the development of the brain and the central nervous system, continue well into the adolescent decade (Brooks-Gunn & Reiter 1990). Thinking processes, such as social cognition, problem-solving skills, language capacity, and visio-spatial skills, also develop during adolescence (Harter 1990, Keating 1990). These developmental changes are accompanied by changes in the nature of the social environments in which adolescents function, as well as in their socially defined roles in these contexts (Brown 1990, Furstenberg 1990, Entwisle 1990). Recognition of the interrelatedness of these aspects of development characterizes

recent biopsychosocial models of adolescent development (e.g. Brooks-Gunn 1987, Buchanan et al 1992, Crockett & Petersen 1993, Lerner & Mulkeen 1990).

One the foremost examples of biopsychosocial models can be found in recent conceptualizations of the relationship of pubertal development to behavior, cognition, emotion, and social relationships (e.g. Brooks-Gunn & Reiter 1990, Buchanan et al 1992, Paikoff & Brooks-Gunn 1991). The hormonal changes that define puberty influence growth and functioning of the brain, the central nervous system, and neurotransmitter processes within the central nervous system, and contribute to observable changes in body shape and morphology, including breast development, gonadal development, and growth of facial and pubic hair (Paikoff & Brooks-Gunn 1991).

Much of the early research on pubertal development was quite naturally concerned with charting the basic biological changes that occur in adolescents (Brooks-Gunn & Reiter 1990). More recent research has pursued a broad biopsychosocial focus in trying to define the relationship between hormonal development and changes in mood and behavior (Buchanan et al 1992), as well as the impact of pubertal development on parent-child relationships (Paikoff & Brooks-Gunn 1991), the interaction of pubertal development with social factors in contributing to adolescent sexual behavior (Rogers & Rowe 1993), and the association between hormonal changes and specific problems such as depression (e.g. Brooks-Gunn et al 1994) and aggression (e.g. Susman et al 1987). Furthermore, these recent efforts have investigated the reciprocal and interactive relationships of hormonal changes with other aspects of cognitive, emotional, behavioral, and interpersonal development (e.g. Belsky et al 1991, Steinberg 1988, Trickett & Putnam 1993).

The association of pubertal development with mood and behavior has represented one of the most active areas of integrative research. The evidence suggests that hormonal changes are linked to mood and behavior, although these relations are complex and the data often inconsistent (Buchanan et al 1992, Crockett & Petersen 1993, Richards & Larson 1993). The links between hormones and mood or behavior appear to differ for boys and girls, with age, for different types of hormones and their interaction with one another, and as a function of pubertal status (e.g. Nottelmann et al 1987, Susman et al 1991, Susman et al 1987).

Another integrative approach involves research concerned with pubertal onset not just as a biological event but as an event that has social and interpersonal ramifications. This research has examined the timing of puberty relative to one's peer group rather than the onset of puberty per se. This research has recognized that the developmental impact of hormonal changes on behavior and emotion are in part mediated by the responses that pubertal changes elicit from others in the social environment. Specifically, it appears that the onset of puberty early or late relative to the timing of this event for one's peers is an

important predictor of behavioral and emotional adjustment (Nottelmann et al 1987, Petersen et al 1991).

Research has also examined the impact of puberty and pubertal timing on the nature of parent-child relationships, especially on parent-child conflict (Paikoff & Brooks-Gunn 1991). Puberty appears to have a predictable but small effect on family relationships, although this association is moderated by a variety of factors including child gender, age at puberty, and family structure (e.g. Hill 1988, Holmbeck & Hill 1991, Papini et al 1988, Steinberg 1987). Researchers have now begun to investigate the processes underlying the observed associations, including responses to biological change, changes in social cognitive processes, self-definitional or identity-related changes, individual or familial characteristics, ethnicity, other social relationship changes, and multiple life-event changes (Paikoff & Brooks-Gunn 1991).

DEVELOPMENTAL BEHAVIORAL SCIENCE Models of adolescent development that consider multiple levels of functioning and analyses have led to a call for interdisciplinary research that draws on the collective knowledge base of several disciplines concerned with human behavior. The most formal proposal for an interdisciplinary approach to the study of adolescent development is reflected in Jessor's call for a "developmental behavioral science" (Jessor 1991, 1992, 1993; Jessor et al 1991). A central element of developmental behavioral science is the abandonment of traditional, parochial models within psychology, as well as an abandonment of a strictly positivist epistemology (Jessor 1993). Research traditions and methods that have developed in sociology, anthropology, child psychiatry, pediatrics, criminology, life course development, demography, and education can all inform a psychology of adolescence. In addition to the integration of traditionally distinct scientific disciplines, developmental behavioral science also includes an integration of the often distinct arenas of basic and applied research. In particular, the high-risk social environments of minority youth are believed to be contexts in which the integration of basic and applied research will be most beneficial.

Developmental behavioral science also holds the concept of interrelatedness as central. For example, research has recognized that the impact of various social contexts (e.g. family, peer, school, and work environments) are each dependent in part on the effects of the other (e.g. Durbin et al 1993, Mortimer et al 1992). Further, developmental behavioral science recognizes the interrelatedness of both healthy and maladaptive developmental outcomes. This has been observed in the interrelatedness of a set of problem behaviors (e.g. substance abuse, delinquency, and drunk driving) that reflect a health-compromising lifestyle (Elliott 1993, Windle et al 1992) and the covariation of syndromes of psychological problems or the comorbidity of psychiatric disorders (Angold & Costello 1993, Compas & Hammen 1994).

MODELS OF PERSON-CONTEXT MATCH   A third perspective on broad integrative models of adolescent development can be found in conceptualizations of adolescent development as a function of the match or fit between the characteristics of the individual and the social environment (e.g. Eccles & Midgley 1989, Eccles et al 1993, Lerner 1985, Lerner & Tubman 1989, Windle & Lerner 1986). Such models construe adolescent development as a dynamic interaction of individual and environmental characteristics. Adolescents evoke differential reactions from the environment as a result of their physical and behavioral characteristics, and environments contribute to individual development through the feedback that they provide to adolescents. The quality of this feedback is dependent on the degree of fit or match between the characteristics of the individual and the expectations, values, and preferences of the social environment. Problematic development is viewed as a function of a "mismatch between the needs of developing adolescents and the opportunities afforded them by their social environments" (Eccles et al 1993, p. 90). The person-environment match model expands in complexity with the recognition that there may be variability in the degree of fit between an individual adolescent and multiple contexts (e.g. school, peer group, family) at the same time (Eccles et al 1993). Moreover, the expectations and demands of these contexts may or may not be in synch with one another.

A mismatch may occur in the form of expectations or demands from the environment that exceed the developmental capacities of the individual. Some demands that challenge current adaptive capacities may provide a stimulus and opportunity for the development of new competencies, whereas other demands may overwhelm the current capacities of the adolescent and may result in high levels of distress and disorder. For example, Elder and colleagues found that in families subjected to economic hardship during the 1930s, many adolescents were given increased responsibilities within the family that challenged their current resources (Elder & Caspi 1988, Elder et al 1984). The long-term outcomes for these individuals, however, appear to have been positive, suggesting that the increased responsibilities presented an opportunity to develop new coping capacities and skills. In contrast, Compas et al (1994) found that adolescents who were faced with the stress of the diagnosis and treatment of cancer in one of their parents showed poorer adjustment than did preadolescent children in their families. The highest levels of anxiety and depression in these families were experienced by girls whose mothers were ill. The increased distress in these girls was accounted for by the increased levels of family responsibilities and duties they were given while their mothers were incapacitated (KE Grant & BE Compas, unpublished manuscript). These contrasting examples suggest that environmental demands may vary in the degree to which they represent an appropriate or inappropriate fit with adolescents' adaptive capacities. Furthermore, mismatches between the

demands of the environment and the adaptive capacities of the individual may show different short- and long-term effects.

Pathways and Trajectories of Development

Current perspectives on adolescent development have evolved significantly since early conceptualizations of adolescence as a period of stress and turmoil for most or all adolescents (Hall 1904). The search for universal descriptions for all adolescents has been replaced by recognition of the wide variability that characterizes psychological development during the second decade of life. Further, individual differences in the associations between childhood functioning and adolescent development, and between adolescent and adult functioning are also recognized. These observations have contributed to interest in individual differences in the paths and trajectories of personal development from childhood through adolescence to adulthood (e.g. Block 1971, Moffitt 1993, Petersen 1993, Powers et al 1989, Rutter 1989, Rutter & Rutter 1993). Identification of developmental paths requires longitudinal data on the same individuals over time, or accelerated longitudinal designs (e.g. Stanger et al 1994, Stanger & Verhulst 1994).

Research on normative and problematic adolescent development has identified five developmental trajectories (see Figure 1). These can be characterized as stable adaptive functioning (Path 1), stable maladaptive functioning (Path 2), adolescent turnaround or recovery (Path 3), adolescent decline (Path 4), and temporary deviation or maladaptation during adolescence (Path 5). Empirical evidence for each of these paths has come from a variety of research endeavors. Stable adaptive functioning is best reflected in youth who traverse adolescence in relatively low-risk environments (Path 1). For example, the development of many adolescents is marked by the absence of involvement in delinquent, antisocial activities or serious emotional problems (e.g. Achenbach 1991). Similarly, the majority of adolescents maintain a positive sense of self throughout adolescence (e.g. Harter 1990). Stable maladaptive functioning is found in the trajectories of individuals who enter adolescence with a personal history of problems or disorder, and who are exposed to chronic stress and adversity in the absence of resources to mitigate against these risks (Path 2). For example, youth with a prior history of aggressive, antisocial behavior during childhood have a high probability of maintaining this pattern throughout adolescence.

Pathways that involve significant change during adolescence are relatively more rare than are stable trajectories, but they are also potentially more informative regarding the personal and contextual factors that account for developmental patterns. One subgroup of adolescents is characterized by a temporary pattern of deviance that is limited to the adolescent years. For example, Moffitt (1993) describes a subgroup of youth who engage in aggressive or delinquent
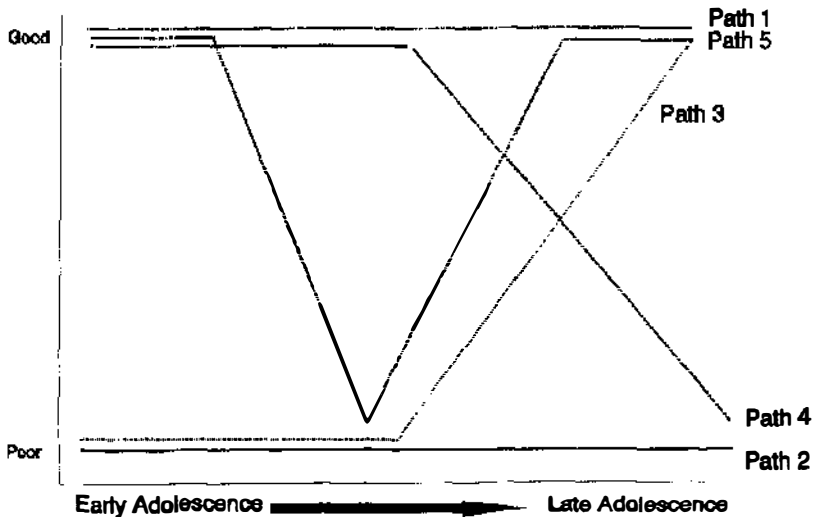
Figure 1 Divergent pathways of development during adolescence. Path 1: stable adaptive functioning; Path 2: stable maladaptive functioning; Path 3: adolescent turnaround; Path 4: adolescent decline; Path 5: temporary deviation or maladaptation during adolescence.

behavior that is limited to adolescence—it is not preceded by such problems in childhood and is not followed by antisocial problems in adulthood (Path 5). Some patterns of temporary deviance during adolescence may represent experimentation with risk-taking behaviors during adolescence but do not reflect the development of a broader deviant lifestyle. A second subgroup can be identified by a pattern of decline in functioning during adolescence following a relatively successful period of development during childhood (Path 4). This pattern is exemplified by exposure to dramatic changes in environmental circumstances during adolescence. For example, changes in family structure such as divorce or remarriage during adolescence can contribute to negative outcomes for some youth. Changes in development can also be the result of biologically-based shifts that do not emerge until adolescence, as some genetic effects do not "turn on" until adolescence or even later in development (Rutter & Rutter 1993). A third pathway involves a turnaround or recovery in which a previously negative developmental pattern is reversed during adolescence (Path 3). Rutter & Rutter (1993) have outlined how important life events and opportunities during adolescence can contribute to an upturn in a developmen-

tal trajectory. One example can be found in the apparent opportunities in the military that are afforded to some individuals whose prior developmental course was headed in a negative direction (Elder 1986).

These different developmental paths have been examined in four ways: 1. paths of development during adolescence (e.g. Alsaker & Olweus 1992, Petersen et al 1991), 2. pathways from childhood to adolescence (e.g. Sameroff et al 1993), 3. pathways from adolescence to adulthood (e.g. Aseltine & Gore 1993, Brooks-Gunn et al 1993, Hammen et al 1994), and 4. lifespan research in which individuals have been followed from early childhood through adolescence into adulthood (e.g. Block et al 1991).

Processes of Risk and Resilience

Recognition of individual differences in pathways of adolescent development is closely linked to interest in those factors that place individuals at risk for a negative trajectory and factors that protect others from these negative paths in spite of exposure to known sources of risk (Anthony & Cohler 1987, Garmezy 1985, Haggerty et al 1994, Rutter & Rutter 1993). Risk factors are those characteristics of the person or the environment that are associated with an increased probability of maladaptive developmental outcomes. Protective factors are hypothesized to interact with sources of risk such that they reduce the probability of negative outcomes under conditions of high risk but do not show an association with developmental outcomes under low risk.

Early research in this area was concerned with the identification of rather static factors or markers that served as predictors of negative outcomes. For example, gender and socioeconomic status are static markers of increased risk for certain negative health and mental health outcomes during adolescence (e.g. Leadbeater et al 1994, Nolen-Hoeksema & Girgus 1994). Some risk markers have been conceptualized in terms of characteristics of individuals, such as genetic predispositions toward specific disorders or a difficult temperament. Similarly, environmental factors, such as exposure to stressful or traumatic life events or chronic poverty and adversity, can be markers of risk.

Although risk factors or markers serve an important function in the identification of individuals with a high probability of subsequent problems, they do not help to explain how or why problems develop. For this reason, research in this area has turned to the search for the processes or mechanisms that account for negative outcomes during adolescence.

One way to conceptualize risk processes is to examine the chain or sequence of events that can unfold as a result of exposure to certain risk factors (e.g. Quinton & Rutter 1988). The impact of stressful major life events on adolescent adjustment also appears to be mediated by more proximal processes in the social environment. Specifically, major life events are related to emotional and behavioral difficulties primarily as a function of the ongoing,

chronic stresses and strains to which they give rise (e.g. Compas et al 1989a; KE Grant & BE Compas, unpublished manuscript; Wagner et al 1988). Stressful events such as parental divorce, personal illness, illness of a parent, or a family move contribute to short-term emotional distress. However, the long-term impact of these events is more the result of chronic disruptions, demands, and strains that they create in the adolescent's social environment (Compas 1994).

The effects of exposure to chronic adversity also appear to be mediated by characteristics of the family environment and chronic stress processes. Conger and colleagues have reported on the relationship of family economic hardship and symptoms of psychological distress among adolescents. For example, Ge et al (1992) reported that economic stress had a direct impact on the quality of the parents' marital relationship, which, in turn, disrupted parent-child relationships, leading to increased adolescent distress. Finally, controlled preventive intervention trials can provide evidence that strengthening certain protective factors or processes can reduce the likelihood of negative developmental outcomes among adolescents who are at risk (e.g. Coie et al 1993).

EXEMPLARY RESEARCH ON PROBLEMS OF ADOLESCENCE

Developments in theory and research on the emergence and course of conduct problems (including aggression and delinquency) and depression during adolescence provide important examples of integrative models, identification of developmental paths, and the search for sources of risk and protective mechanisms.

Aggression and Antisocial Behavior

Although most adolescents become well-adjusted adults, a substantial proportion of adolescent males will have some experience with delinquent behavior.[1] A recent analysis of a large New Zealand sample revealed that 93% of males acknowledged some delinquent activity prior to age 18 (Moffitt 1993). These results echo similar findings showing that one third of US males report police contact by adulthood for serious crimes, and four fifths report contact for more minor offenses (Moffitt 1993). These data suggest that adolescent delinquency is common and prevalent for boys and may even be described as normative. Moffitt (1993) suggests that for many boys, delinquency is not only normative

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[1] Aggression and antisocial behavior have been studied far more extensively in males than in females, as the prevalence of these behaviors is markedly higher in males. Recent work (Caspi & Moffitt 1991, Caspi et al 1993) with female samples, however, suggests that there may be similarities between antisocial boys and girls.

but is also "adjustive" in that it serves a developmental function by expressing autonomy. The frequency and apparent normality of these behaviors should not, however, obscure their seriousness. Adolescent offenses are often serious and result in negative consequences for the adolescent and for society as a whole.

How do we understand and explain aggression as both a phenomenon of individual development and as a defining feature of a particular developmental period? Recent research in this area has been creative and fruitful, generating hypotheses that promise to help illuminate the nature, etiology, and processes of risk and resilience associated with aggression and delinquency.

BIOPSYCHOSOCIAL MODELS OF AGGRESSION DURING ADOLESCENCE   Integrative models of adolescent aggression can be divided into two types. The first type looks to early and chronic biological, psychological, and social factors that influence the development of an aggressive, antisocial personality or behavioral style that manifests itself in adolescence as delinquency. The second type looks to more proximal factors to explain these behaviors during adolescence. It now seems likely that these divergent models describe qualitatively different processes leading to similar negative outcomes.

Investigators of antisocial behavior have noted that aggression is a profoundly persistent, chronic, and intractable characteristic of certain individuals (e.g. Caspi et al 1990, Farrington et al 1990, Robins 1985). Caspi et al (1990) proposed that antisocial behavior reflects an "ill-tempered" interactional style that is developed initially in childhood and persists through adulthood. This interactional style is believed to develop from an insidious transactional process between subtle, congenital neuropsychological deficits and criminologic environments that inadvertently reward aggressive behavior (Moffitt 1993). This style is also thought to be most salient when unfamiliar environments need to be negotiated or during periods of uncertainty such as developmental transitions (Caspi et al 1990). Once developed, individuals who display this interactional style continue to select environments that favor and sustain them, thus creating a lifelong disposition to antisocial behavior (Caspi et al 1990). Longitudinal research (e.g. Farrington et al 1990) has shown that these characteristics are stable and are related to the environmental risks outlined by Caspi et al (1990). In addition, recent findings have supported this model by explaining adolescent aggression in girls. In a sample of 348 girls from New Zealand, Caspi & Moffitt (1991) found that girls predisposed to behavior problems in childhood were more likely to exhibit increases in aggressive and delinquent behavior during adolescence as a result of early maturation.

A second integrative model that examines multidimensional, early and chronic factors to explain adolescent aggression and antisocial behavior is Jessor's "problem behavior" or "risk behavior" theory. Jessor (1993) proposes

that risk behavior is a lifestyle created by the interaction of the individual's biological-genetic characteristics, social environment, perceived environment, personality, and behavior. This model is supported by empirical studies showing that each of these factors, when considered independently or in combination with others, predicts aggressive or antisocial outcomes (e.g. Cohen et al 1990, Farrington et al 1990).

Other investigators have approached adolescent behavior problems as a more developmentally specific issue involving more proximal causal factors, such as school and contemporaneous family environments. For example, Eccles et al (1993) have suggested that poor person-environment fit for the adolescent, at home or in school, may account for the increase in behavior problems observed in community school samples of adolescents. Their research reveals that with increasing age and educational level, adolescents desire more participation in classroom and family decision-making but have decreasing opportunity to do so. They hypothesize, therefore, that adolescent "acting out" stems from the failure of schools or families to accommodate and reflect adolescents' increasing needs for autonomy and control.

Moffitt (1993) offers an integrative model for adolescent antisocial behavior that complements and extends person-environment fit models. She hypothesizes that the bulk of adolescent delinquency results from a historical phenomenon—a maturity gap—created by the incongruity of achieving biological maturity at adolescence without simultaneously being awarded adult status. Under these circumstances, delinquency becomes an avenue for self-definition and expression of autonomy, a maturity substitute. It is an adaptive attempt by the adolescent to bridge the gap between changing self perceptions and circumscribed social roles.

The potential role of physiological changes in the manifestation of adolescent aggressive and/or antisocial behavior has also been recognized in recent research. Animal studies and studies of adult criminality and violent behavior have largely supported the view that hormonal processes influence the expression of aggression (e.g. Inoff-Germain et al 1988). Recent work on the relation of hormones to aggressive behavior in adolescents suggests that the levels of circulating hormones related to sexual development may be related to measures of aggressive behavior for boys and girls (Susman et al 1987, Inoff-Germain et al 1988). In addition to hormonal influences on aggression, Robins & McEvoy (1990) have suggested that biological factors may play an important role in both conduct problems and substance abuse. Their findings show that conduct problems in childhood and adolescence are related to early drug use, which is strongly and independently related to serious, long-term substance abuse problems. They suggest that the powerful, independent relationship of early drug use to long-term problems may result from the use of drugs during a

biologically critical period prior to completion of puberty, when effects of drugs may be more salient.

DEVELOPMENTAL PATHWAYS OF AGGRESSION   Developmental data on aggression and antisocial, delinquent behavior present an intriguing puzzle—these problems are persistent yet they increase dramatically in frequency during adolescence. A stable portion of males appear to develop aggressive and conduct problems early in life and sustain these behaviors into adulthood (Farrington et al 1990, Robins 1985). Virtually all men diagnosed with adult antisocial personality disorder carried a diagnosis of conduct disorder in childhood (Robins 1985). Thus, there is ample empirical support for an identified chronic antisocial, delinquent, criminal pathway. In contrast to the observed chronicity of this antisocial pathway, however, delinquency is also distinctly a problem of adolescence, with numbers of crimes and variety of crimes increasing dramatically during this period (Moffitt 1993, LeBlanc 1990). This increase appears to be the result of an increase both in the numbers of crimes and in the number of individuals involved in criminal activity, such that individuals not previously committing delinquent acts begin to do so during adolescence. This increase during adolescence declines in early adulthood to rates similar to those reported prior to adolescence (LeBlanc 1990, Moffitt 1993).

The apparent contradictory observations that aggression and delinquency are both transient and stable is resolved by recognition of two distinct subgroups of males who display these problems and follow two distinct developmental pathways. The first involves a trajectory of chronic poor adjustment— early conduct problems that escalate and manifest as juvenile delinquency in adolescence. The second is represented by an adolescent deviance trajectory in which great numbers of previously well-adjusted adolescent males experiment with delinquent behavior and join their more chronic, delinquent peers (Moffitt 1993; see also Figure 1 above).

The two different pathways of antisocial behavior have been hypothesized to have different causal factors and processes. Moffitt (1993) suggests that a small group of adolescent males represents a chronic, persistent course of delinquency, evolving from the interaction of early biological and environmental factors. During adolescence, these antisocial boys seem relatively independent and mature, and thus become temporary role models to other more well-adjusted boys who are seeking self-definition and mature status. This model is supported by numerous findings of changing prevalence of antisocial behavior across the life course, and identified risk and resilience factors for early conduct versus later conduct problems (e.g. Farrington et al 1990, LeBlanc 1990). Moffitt's model reconciles the apparent contradictory realities of persistent versus transient offending and the latter's distinct relation to adolescence.

A third trajectory of adolescent decline (see Figure 1), although less discussed and explored in the literature, may be extrapolated from Moffitt's model. As she suggests, previously well-adjusted adolescents may experiment with particular delinquent behaviors that have long-term effects, such as alcohol and substance abuse and/or irresponsible sexual activity. Through such behaviors and their consequences (e.g. drug dependence, pregnancy, HIV infection), these adolescents may enter a course of steady decline. This group may consist of relatively more adolescent girls, whose antisocial activities are less documented and perhaps less understood. Early-maturing adolescent girls in particular have been identified as a risk group for adjustment problems in general. They are certainly more vulnerable for the long-term consequences of teenage pregnancy and may be more at risk for serious substance abuse problems (Robins & McEvoy 1990), making them likely candidates for a trajectory of adolescent decline.

Lastly, a trajectory of adolescent turnaround (see Figure 1) may be hypothesized from the literature on aggressive children. Farrington et al (1990) have identified a group of boys with hyperactivity-impulsivity-attentional problems who do not present with serious conduct problems. These boys, though troublesome and difficult as children and at risk for juvenile convictions, are unlikely to develop criminal careers in adulthood. For example, Farrington et al (1990) found that fewer boys in the hyperactivity-impulsivity, nonconduct problem group had adult convictions than did boys in the well-adjusted childhood group (8% vs 14.3%). Thus, these boys may represent a group whose earlier problematic functioning improves as they pass through adolescence into adulthood.

RISK AND RESILIENCE   Identification of risk and resilience factors and processes is of necessity closely linked to correct identification of developmental pathways. Investigators of adolescent aggression and delinquency have focused on both distal and proximal processes. Moffitt's (1993) model of two distinct pathways to antisocial behavior in adolescence hypothesizes that early-life risk factors may be associated with the more chronic life-course-persistent trajectory and that more contemporary risk factors such as puberty and changing social definition are associated with adolescence-limited antisocial behavior.

Demographic variables (e.g. gender, low SES, and large family size), environmental characteristics (e.g. neighborhood crime and poor housing), parenting behaviors (e.g. poor paternal interactions, poor supervision, low level of control, and power-assertive punishment), and parent characteristics (e.g. low maternal competence, paternal alcoholism, and/or criminality) have been associated with aggressive, adolescent antisocial behaviors and juvenile delinquency (Farrington et al 1990, McCord 1990, Cohen et al 1990, Moffitt 1993). Many of these variables have been associated with long-term, chronic criminal

offending and alcoholism as well, and as such may be more defining of Moffitt's "life-course persistent" group and not as relevant to the adolescent-limited group.

In addition to these demographic and psychosocial variables, childhood behavior problems such as oppositional behavior and childhood hyperactivity predict juvenile delinquency. Comorbidity of these problem areas appears to be additive in effect, increasing risk for juvenile delinquency (Farrington et al 1990). Early onset of conduct problems, prior to age 9, is a risk factor for stable and frequent offending (LeBlanc 1990). Conduct problems in childhood also predict earlier adolescent substance use and long-term substance abuse problems.

Moffitt (1993) suggests that adolescent-limited delinquency is a risk of industrialized cultures where children attain biological maturity before they attain adult status. This gap is a key risk factor and provides the motivation and contingencies for temporary acting out. The experience of this gap appears to be more prevalent for boys, and for early maturing girls who are at increased risk for delinquency (Moffitt 1993, Caspi & Moffitt 1991), and seems to be mediated for girls by exposure to boys who would be delinquent peers. Thus, boys who are increasing their delinquent behavior appear to be a risk factor for girls both in that they provide delinquent models and in that relationships with boys may provide a sense of maturity for girls.

Depression During Adolescence

Depression remains one of the most significant mental health problems throughout the lifespan as reflected in its high prevalence among adults (Weissman et al 1991), the debilitating effects of moderate to severe expressions on overall functioning (Gotlib & Hammen 1992), and its association with other negative outcomes including substance abuse (Weissman et al 1991). Recent research has pointed to adolescence as an important developmental period for understanding depression, because many significant changes in depressive problems occur during adolescence (Petersen et al 1993).

DEFINING DEPRESSION DURING ADOLESCENCE   Recent integrative perspectives have recognized the significance of three levels of operationalizing depression during adolescence (e.g. Angold 1988, Compas et al 1993a). Depressed mood (Kandel & Davies 1982), an anxious-depressed syndrome (Achenbach 1991), and depressive disorders (American Psychiatric Association 1994) all have important implications and unique contributions for understanding significant psychological problems during adolescence and all contain unique features during adolescence. Compas et al (1993a) have proposed a sequential and hierarchical model for the associations among these multiple levels of depression: A large portion (30–40%) of adolescents experience significant depressed

mood at any one point in development, with a smaller group (5–6%) experiencing significant levels of a depressive syndrome, and a still smaller segment (2–3%) of the population experiencing depressive disorders. These groups are viewed as embedded within one another, with each group in the hierarchy representing a subgroup of the others. Further, these levels of depression are hypothesized to develop sequentially over time. Initial empirical investigations have provided partial support for such a model (e.g. Edelbrock & Costello 1988).

BIOPSYCHOSOCIAL MODELS OF DEPRESSION DURING ADOLESCENCE   Current models of depression recognize the significance of biological, psychological, and social factors (e.g. Gotlib & Hammen 1992, Shelton et al 1991, Petersen et al 1993). Biological factors that are implicated in the emergence and course of depression during adolescence include neuroendocrine processes, dysregulation of neurotransmitters, dysregulation of biological rhythms such as sleep patterns, and a family history of depression that is suggestive of a genetic risk for the disorder (e.g. Brooks-Gunn et al 1994; Dahl et al 1991, 1992). Cognitive or psychological factors that are associated with depression during adolescence include a dysfunctional style of attributing the causes of success and failure (Kaslow 1994), negative perceptions about the self (Garber et al 1993), hopelessness about the future (Kazdin et al 1986), and a maladaptive style of coping with stress (Compas et al 1993b). Social factors associated with adolescent depression entail family dysfunction (including parental depression), psychosocial stress, and poor peer relationships (Cole 1991, Compas et al 1994a, Hammen 1991).

When these various perspectives on depression during adolescence are considered together it is apparent that dozens of factors may interact in their relationship with depressive problems among adolescents. For example, Brooks-Gunn & Warren (1989) found that pubertal stage was not related to symptoms of depression or social withdrawal in a sample of adolescent girls. However, negative life events were more likely to be associated with these symptoms in pre- than in postmenarcheal girls. Early maturing girls (Petersen et al 1991) and late maturing boys (Nottelmann et al 1987) report more depressed affect, again indicating that the social ramifications of puberty are important. In a novel study that integrated biological and psychological factors related to depression, Ewart & Kolodner (1994) found that negative affect, including depressed mood and anger, was related to prevailing blood pressure levels in adolescents. Further, this association was found to be moderated by gender, a nonverbal expressive style, and social setting (e.g. in a classroom vs with friends). Drawing on a general diathesis-stress framework, Robinson and colleagues (NS Robinson, J Garber, R Hilsman, unpublished manuscript) found that a negative attributional style interacted with recent stressors to predict depressive symptoms but not externalizing behavior problems. The

need for integrative research is further reflected in the recognition of the high degree of co-occurrence of depressive symptoms and the comorbidity of depressive disorders with other symptoms and disorders during adolescence (e.g. Angold & Costello 1993, Compas & Hammen 1994, Nottelmann & Jensen 1994).

The challenges for researchers in this area are clear—to distinguish correlates from causes, to identify how these factors interact to contribute to the cause versus maintenance of depression, to delineate the processes that account for depression in some adolescents and not others, and to distinguish risk factors associated with depressed mood versus syndrome versus disorders. These goals will not be achieved by continued pursuit of these factors in isolation; integrative models and research are necessary.

DEVELOPMENTAL PATHWAYS OF DEPRESSION   Some of the most provocative empirical evidence on depression during adolescence has come from longitudinal studies of developmental paths that entail depressive problems. Early to middle adolescence marks a point of increased depressed mood, depressive syndromes, and depressive disorders (e.g. Rutter 1986). Increased rates of depressive problems, as well as the substantially higher rates of these problems for females as compared to males, emerge during adolescence and remain relatively stable into adulthood (Petersen et al 1993). Thus, longitudinal data suggest that there is something special about adolescence in understanding developmental processes in depression. An important next step in this research involves documenting the paths of depressive problems during adolescence.

Data from one of the largest investigations of the course of depression and other disorders during adolescence revealed high rates of relapse (Lewinsohn et al 1991, 1993; Rohde et al 1991), which suggests that depression is recurrent among adolescents who have experienced an initial episode. Data on the recurrent nature of depressive disorders indicates that the course of clinical depression is characterized by both change and continuity. That is, depression is episodic rather than stable and unremitting over long periods of time. On the other hand, depression shows continuity—once an individual has experienced a significant depressive episode, she or he is at substantially increased risk for a recurrence in the future (Lewinsohn et al 1991). Therefore, the stable maladaptive pathway described above characterizes a subgroup of adolescents who experience depression, with the qualification that even the group that shows the most persistent pattern of depression will experience sustained periods in which they do not meet diagnostic criteria for a depressive disorder (Lewinsohn et al 1991).

The probability that significant depression will be first observed during adolescence is much greater than an initial onset during childhood, suggesting

the group characterized by an adolescent decline in adaptation is larger than a group whose depressive problems have continued since childhood. The available evidence also suggests that individuals who experience significant levels of depression during adolescence are unlikely to experience a complete turnaround, because they are at high risk to experience a reoccurrence during adulthood (Harrington et al 1990). Furthermore, those individuals who have experienced conditions that are comorbid with depression during adolescence appear to be at even greater risk for continued depression or recurrences (Hammen et al 1994).

As noted above, depressed mood, depressive syndromes, and depressive disorders all co-occur with other problems at a high rate (Compas & Hammen 1994). Studies of co-occurrence and comorbidity indicate that depressive problems typically follow rather than precede other problems (e.g. Kovacs et al 1984, 1988).

Longitudinal studies also show that the course of depressive problems differs for males and females. In a longitudinal study of 335 adolescents randomly selected from two school districts, Petersen et al (1991) found no significant sex differences in measures of depressed affect or number of depressive episodes in early adolescence (grades 6–8), but there were significant gender differences in the twelfth grade follow-up assessment. Girls began to show an increase in depressed affect in the eighth grade, with boys remaining at a relatively stable level. In the twelfth grade, girls scored significantly worse on measures of depressed affect and emotional tone and had a significantly higher number of depressive episodes than did boys. Block et al (1991) investigated the role of behavior and personality antecedents in the manifestation of depressive symptoms at 18 years of age. For males and females displaying depressive tendencies at age 18, the authors note several significant correlates at ages 3/4, 7, and 11 years, which correspond to proposed internalizing and externalizing personality profiles. These correlates are less exhaustive but similar to those found at age 14. In addition, males who were subsequently depressed at age 18 were more likely to acknowledge the use of marijuana at age 14, whereas the dysthymic females were more likely to acknowledge the use of harder drugs. The authors suggest that this unexpected finding for females "may represent a desperate, convoluted attempt to escape a personal situation, already viewed as hopeless, by changing the inner world" (Block et al 1991). These findings suggest that personality characteristics may serve to explain the sex differences in the expression of depression during adolescence.

RISK AND PROTECTIVE MECHANISMS   Consistent with a biopsychosocial perspective on depression during adolescence, there is evidence for sources of risk in the biological, psychological, and social domains. Clearly the four most significant markers of risk for depression during adolescence are age, gender, a

family history of depression, and exposure to stressful events and life circumstances. Early to mid-adolescence marks a time of significant increase in the risk for depression as compared with childhood (Petersen et al 1993). Gender is an equally strong marker; adolescent girls are at least twice as likely as boys to develop depression (e.g. Nolen-Hoeksema & Girgus 1994), a pattern that is not evident in childhood. Parental depression places children and adolescents at increased risk for depressive problems as well as a host of other emotional and behavioral difficulties (Cummings & Davies 1994, Downey & Coyne 1990, Hammen 1991, Lee & Gotlib 1991). Finally, stressful life events and chronic stress or adversity also are associated with increased risk for depressive symptoms and disorders (Compas et al 1994b).

In the biological realm, there is some evidence that the sleep onset mechanism is impaired in some depressed adolescents, as evidenced by decreased growth hormone secretion, increased cortisol, and increased time until sleep in a subgroup of depressed adolescents who expressed suicidal intent (Dahl et al 1992). Genetic loading may be higher for depression that has an initial onset during childhood or adolescence (Puig-Antich 1987, Strober et al 1988).

Research examining mechanisms of risk that may explain how and why risk markers lead to depression has been relatively rare. One active area of research on risk mechanisms has focused on parent-child interactions in families with a depressed parent, most typically a depressed mother. Hammen and her colleagues have found that the interactions between depressed mothers and their children (including adolescents) are characterized by irritability and negativity, and that levels of mother and child stress and strain closely coincide (e.g. Adrian & Hammen 1993, Hammen et al 1991). A second area of risk-mechanism research has focused on stress processes. The accumulation of negative life events also serves as a marker of subsequent increases in depressed mood and symptoms of depressive syndromes and disorders (e.g. Compas et al 1989a; Dubois et al 1994; NS Robinson, J Garber & R Hilsman, unpublished manuscript; KE Grant & BE Compas, unpublished manuscript). Discrete stressful life events appear to contribute to depressive outcomes at least partly through chronic or minor stress in the proximal environment.

In an effort to explain the sex difference in adolescent depression, Petersen et al (1991) proposed and tested a model for the development of mental health in adolescence. This model incorporated prior mental health difficulties, timing and nature of life events (stressful or normative), and the buffering effects of family and peer support and coping responses. They found that gender differences in depressed affect were related to the synchronicity of pubertal and school change, and sex differences in the number of depressive episodes were related to early pubertal timing in girls. The authors note that since only girls showed long-term negative effects of early puberty and since they are

more likely to experience pubertal change simultaneously with school change, this may further explain the increase in depression in girls during adolescence. Petersen et al (1991) suggested that these stressful events may actually improve boys' confidence and coping skills, thus providing a buffering effect. Lastly, although an adolescent's relationship with a best friend was not associated significantly with depressed affect, closeness with parents, especially fathers appeared to moderate the effects of early adolescent changes. Specifically, closeness with mothers buffered negative effects of family changes, while closeness with fathers buffered both family change and synchronous school and pubertal change.

In a longitudinal study of cognitive and ego development, Block and colleagues investigated gender differences in depressive symptoms along with their familial and personality antecedents. Relative to nondysphoric males and females and dysphoric females, male adolescents with depressive tendencies were observed as relatively antagonistic, unrestrained, unhappy with self, and unconventional in thought and behavior, and described themselves as alienated and relatively aggressive, having a tendency to worry, feeling vulnerability, and a lack of a sense of psychological well-being (Gjerde et al 1988). In a similar comparison, dysphoric females were not observed as socially impaired or aggressive, but they described themselves as relatively aggressive, unrestrained, alienated from others, and having low self-esteem (Gjerde et al 1988).

To elaborate on the involvement of personality characteristics in the manifestation of depression at age 18, Block & Gjerde (1990) analyzed data obtained during childhood. Females with high depressive symptom scores at age 18 performed significantly higher on the performance IQ subscale and the full IQ scale as assessed at age 4. At age 14, girls displayed personality traits, termed collectively as ego brittleness, including feelings of vulnerability, anxiety, somatization, concern with adequacy, rumination, and feelings of little personal meaning in their lives. Additionally, low self-esteem assessed at age 14 was significantly related to depressive symptoms in 18-year-old females. Although 14-year-old boys also exhibited ego brittleness similar to their female counterparts, antisocial and hostile characteristics became even more prominent for these males. Further, females who exhibited dysphoric tendencies at age 18 tended to display concern with morality and loss in play at age 11. Females who scored relatively low or high on the depression scale also displayed more anger, themes of loss, and were more overcontrolling of impulse as compared to those in the middle range. Males who scored relatively high or low on the depressive symptoms measure exhibited more anger and concern with loss than did males in the middle range. Contrary to results found for females, these males also tended to be less controlling of impulse.

EMERGENT THEMES ON ADOLESCENT DEVELOPMENT

Contributions

The gradual emergence of integrative models that consider pathways of development as a function of risk and protective processes has had a number of benefits for the psychology of adolescence. First, these approaches have facilitated interdisciplinary research, breaking down the often artificial boundaries that contribute to fragmentation of theory and research and unproductive battles over intellectual turf. Collaborative efforts that draw on skilled researchers from psychology, medicine, education, sociology, and other disciplines have been developed to tackle significant problems pertaining to adolescent development. These efforts should yield more comprehensive perspectives on both normal and atypical development during adolescence.

Second, these research themes underscore the importance of adhering to a developmental perspective that captures both the continuities and discontinuities of individual development. Most adolescents traverse this developmental period without major psychological or behavioral problems. A growing segment of the adolescent population, however, is represented by other developmental trajectories that include in some cases brief and in other cases enduring problems. Longitudinal research efforts have been undertaken to chart these individual differences in pathways through adolescence. Attention to individual differences in the course of adolescent development will help resolve the apparently contradictory results that are found when only aggregated data are examined (Moffitt 1993).

Third, these themes capture the transactional nature of development and behavior, in which both person and context as well their mutual influences on one another are examined. Simple main effects models in which aspects of the person or the environment are given precedence over the other are insufficient to explain the complexity of different developmental paths through adolescence. The findings described above are clear in their implications for understanding problems of aggression and depression, as well as other aspects of adolescent development.

A fourth benefit of these themes has been their contribution to research on a number of important aspects of normative development during adolescence (e.g. parent-adolescent relationships, identity development, effects of schooling) as well as atypical development (e.g. alcohol, tobacco, and substance abuse; teen pregnancy; suicide; delinquency). Continued integration of research on normative and deviant development during adolescence will be useful to the field, as research on normative and clinical populations can inform each other.

Limitations

Despite the significance of these themes for the development of a psychology of adolescence, they have some limitations. First, overly broad conceptual models violate the fundamental scientific principle of parsimony. That is, broad integrative models that include multiple levels of analysis run the risk of describing much but explaining little. A challenge for proponents of biopsychosocial models is to determine which elements are necessary and sufficient to explain the important features of adolescent development. For example, although broad contextual factors are important correlates of significant problems during adolescence, they may carry no additional weight in explaining individual differences in developmental paths after accounting for more proximal characteristics of the environment. Similarly, family history of a specific problem may be interpreted as consistent with a genetic process when it may be fully accounted for by a history of dysfunctional interactions and relationships within the family. The identification of correlates of adolescent functioning at multiple levels of analysis does not insure that these correlates all play important causal roles in adolescent development.

Second, basic psychological models (e.g. learning theory) have been misrepresented and used as straw targets for arguments that enhance the appearance of integrative models at the expense of increasingly complex models that already are available. Learning- or conditioning-based explanations of development have frequently been criticized for being mechanistic and reductionistic (e.g. Jessor 1993). More recent conceptualizations of fundamental processes of learning and conditioning are far from mechanistic in nature, drawing instead on the rich tradition of associationist models (e.g. Rescorla 1988). As the field continues to develop broad interdisciplinary models, there is an increased risk of losing what is unique in the perspective of psychology as a discipline.

Third, recent approaches to research on adolescent development value macro-level longitudinal research to the extent that micro-level studies, including laboratory experimental methods, may be overlooked. For example, research on the nature and development of coping processes during adolescence has been influenced strongly by a paradigm of coping research that relies exclusively on self reports of coping in natural contexts (Compas 1987). Some of the complex cognitive processes that are involved in coping with stress cannot be understood adequately without additional information that can only be obtained in controlled laboratory contexts (e.g. Nolen-Hoeksema 1991). Further, microanalytic studies of the subtle changes of mood and behavior that characterize the daily lives of adolescents make important contributions that complement broader longitudinal studies (e.g. Richards & Larson 1993).

Fourth, the broad themes that are guiding adolescent research may not be useful in the search for specificity in some developmental processes or some problems or forms of psychopathology. Although many of the problems of adolescence are interrelated, they may be the result of separate risk mechanisms. For example, depression and aggression may co-occur but as a result of separate risk processes (e.g. Downey & Coyne 1990). Marital conflict and discord is associated with child and adolescent aggression, and parental depression is a risk factor for child and adolescent depression. Marital discord and parental depression are highly intercorrelated, however, and may function as distinct but correlated risk factors for separate but correlated outcomes. Attention to specific risk mechanisms will be important for understanding the etiology of distinct but related problems during adolescence (Garber & Hollon 1991).

Fifth, more cross-cultural research and research with ethnic minority adolescents is needed to place adolescent development in its social context. The adolescent population in the United States continues to become a more ethnically diverse group, partly as a result of immigration. Understanding the experiences of these populations has become an increasing focus of adolescent research. For example, Feldman et al (1991) have examined conduct problems and family environments in Hong Kong, Australia, and the United States; Chiu et al (1992) examined the influence of immigration on parental behavior and adolescent distress in Chinese families residing in the United States and Australia; Linares et al (1991) identified subgroups among African-American and Hispanic-American adolescent mothers; and Rosenthal & Feldman (1991) have examined the influence of perceived family and personal factors on school performance of Chinese and Western high school students.

CONCLUSION

These recent trends in research and theory concerned with adolescent development offer a solid foundation for continued understanding of both normative and atypical developmental processes and paths during the second decade of life. The field will benefit from renewed debate about the usefulness of fundamental psychological models for understanding adolescent development. Recognition of the significance of biological, psychological, and social processes provides a broad framework for understanding adolescent development. More specific models are needed, however, to add greater precision to theory and research on delineated aspects of adolescent functioning. Continued consideration of models from learning theory, cognitive science, and social psychology will be useful in pursuing research on adolescent development. Furthermore, integration of longitudinal and laboratory experimental research, including the

integration of research with animal and human populations, will provide a more complete and rich understanding of adolescent development.

Finally, increased attention to the implications of research for interventions is needed to improve the quality of life for adolescents and to guide the development of sound public policy (Dougherty 1993, Zaslow & Takanishi 1993). In spite of the significance of psychosocial problems of adolescence, well-designed and evaluated interventions for the prevention and treatment of these problems have been rare. The strong knowledge base on biopsychosocial processes in adolescent development provides a foundation for the continued development of interventions to address the problems of adolescence.

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