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RAUS

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Etiology of Drug Abuse

Implications for Prevention

U. S. DEPARTMENT OF HEALTH AND HUMAN SERVICES • Public Health Service • Alcohol, Drug Abuse, and Mental Health Administration

Etiology of Drug Abuse: Implications for Prevention

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Division of Clinical Research
National Institute on Drug Abuse

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Preface

The Research Analysis and Utilization System (RAUS) is designed to serve four functions:

- Collect and systematically classify the findings of all intramural and extramural research supported by the National Institute on Drug Abuse (NIDA);
- Evaluate the findings in selected areas of particular Interest and formulate a state-of-the-art review by a panel of scientific peers;
- Disseminate findings to researchers in the field and to administrators, planners, instructors, and other interested persons:
- Provide a feedback mechanism to NIDA staff and planners so that the administration and monitoring of the NIDA research program reflect the very latest knowledge gleaned from research in the field.

Since there is a limit to the number of research topics that can be intensively reviewed annually, four subjects are chosen each year to undergo a thorough examination. Distinguished scientists are invited to participate. Each scientist is provided reports from NIDA-funded research and asked to add information derived from the literature and his or her own research and prepare a comprehensive state-of-the-art review paper on an assigned topic. These papers, together with a summary of the discussions and recommendations which take place at the review meeting, make up a RAUS Review Report in the NIDA Research Monograph series.

"The Etiology of Drug Abuse: Implications for Prevention" was selected as a subject for a comprehensive RAUS review in 1984 so that the results of etiologic research on adolescent drug use could be utilized to improve efforts to prevent drug abuse.

Inherent in this task was the need to expand the age of concern beyond adolescence by including predisposing factors in childhood and drug use patterns during the transition from adolescence to young adulthood. The results of these reviews are presented in this monograph.

Drs. Richard Jessor. Coryl Jones, and Robert Battjes served as the scientific moderators of the meeting. Dr. Jessor's chapter provides a critical review of the discussions which took place at the meeting and the final chapter by Drs. Battjes and Jones summarizes recommendations for future etiologlc research and prevention programs. Jacqueline P. Ludford, Chief, Research Analysis Branch, Office of Science, is the RAUS coordinator for NIDA.

Contents

The Context and Caveats of Prevention Research on Drug Abuse

Coryl LaRue Jones, Ph.D., and Robert J. Battjes, D.S.W.

Research on the etiology of drug abuse has long been an important part of the program of research of the National Institute on Drug Abuse (NIDA) and its predecessor, the Division of Narcotic Addiction and Drug Abuse of the National Institute of Mental Health. This etiologic research has sought to identify factors which place persons and populations at risk for drug abuse. In recent years, preventive interventlon research has emerged to develop and test interventions to prevent the onset of drug use and to intervene early in the course of experimentation with drugs to prevent continued use. In 1982, NIDA established the Prevention Research Branch to support etiologlc and prevention research and to bring these two fields together in a working alliance. Developing such an alliance has involved mixing disciplines, professional roles, and types of research.

To aid in this process, the Prevention Research Branch sponsored a Research Analysis and Utilization System (RAUS) review, held April 24 and 25, 1984, to consider three fundamental needs of prevention research: a) identifying factors which seem to make some youth and young adults more (or less) vulnerable than others to drug use; b) exploring the ways in which current knowledge of risk factors and related theories of drug use have influenced and might further influence the development of preventive interventions; and c) identifying areas for future research on the etiology of drug abuse which can contribute to the development and refinement of preventive interventions. An additional purpose of this review was to expand upon an earlier RAUS review focused on adolescents (Lettieri and Ludford 1981) by including that which precedes and that which follows adolescence, specifically, early childhood and preadolescent developmental factors as they relate to subsequent drug abuse, and drug use in relatlon to the transition from adolescence to young adulthood.

With this mandate, instead of clear-cut answers, the reader will find in this monograph a challenge to earlier ways of thinking about drug abuse and its preventlon. The papers explore how causality, or etiology, and the prevention of drug abuse may

reside in the experiences, events, exposure, and synchrony of timing which can match risk with availability of drugs, opportunity to use them, and vulnerability to influences conducive to drug use. In doing so, the papers often reveal how cause and consequence of drug use are inextricably entangled. Drug consequence at one point of a person's life can be a contributory cause of the next sequence of events, with research suffering from a lack of information on the processes occurring in the intervals between data collection and the lack of validity of recall of the subjects. Also, the results of measuring different attributes associated with drug use are often bimodal, perhaps conflictual, e.g., that which is appropriate at one age or in one context may be inappropriate at another, such as the dependency of a young child on the parent which is not developmentally appropriate for an adolescent challenged with developing his or her own sense of competence. Only when the influences under study are considered in depth, within context, and with the recognition that different ranges exist within which a trait may be optimal at different developmental ages does the evidence begin to come together in coherent form.

The reader may also find that the results from different types of etiologic research with different samples appear to support different theories of drug use and also that work based on different and apparently conflicting theorles supports similar interpretations.

The authors provocatively question what it is we are trying to prevent. Is the goal of drug abuse prevention abstinence, delayed onset of use (and if so, of what substances), avoidance of certain substances, or prevention of dysfunctional use? The definitions, utility, and scaleability of such terms as "initiation" and "experimentation" were questioned, as were the concepts on "gateway drugs," "drug stage theory," and the type and timing of interventions.

Although prevention research on drug abuse is still a relatively amorphous, new field combining epidemiologic, etiologlc. and intervention research, the following brief account of the background and caveats affecting the development of preventlon research hopefully will indicate why certain topics were selected for presentation in this RAUS review and the significance of the topics to further development of the field.

BACKGROUND

The topics selected for review derive from the evolution of the links between etlologic research and preventive interventions, the urgent needs to identify specific populations at risk and factors amenable to intervention with these different populatlons, and the need to develop a sound theoretical base from etlological. human development, and social change research for the design of prevention and early intervention programs.

Drug abuse prevention programs initiated in the late 1960s and early 1970s focused almost exclusively on providing youth with information on drugs and their effects. The assumption was that youth would not use drugs if they knew the facts about their dangers. Information alone quickly proved to be inadequate. Subsequent programs began to address psychological and social factors which influence human behavior. Self-esteem, self-reliance, and alienation were among the psychological factors prevention programs began to address. For example, education programs focused on helping youth develop decision-making abilities and interpersonal skills in communication and self-assertion. Programs designed to provide youth with alternatives to drug use began to involve teenagers in such activities as tutoring younger children, implementing community improvement projects, or developing vocational skills to help them gain a sense of worth and competence. Many of these programs did not focus on drug abuse per se, based on the belief that, if the underlying dynamics could be modified, drug use could be prevented.

Other prevention programs began to focus on social factors related to drug use. For example, some programs focused on peer, family, and media influences to help youth identify pressures to use drugs and to help them develop specific skills to resist these pressures. Parents joined together and formed parent action groups to counter peer and environmental influences conducive to drug use. Prevention programs began to expand the scope of their programs in recognition of the multiple factors influencing drug use. Social skills programs began to include and combine affective education, techniques to resist influences to use drugs, and drug use information.

When prevention program planners began to turn to findings and theories drawn from etiologic research, they found that the impiications for prevention were seldom specific enough for direct application and were not applicable across populations and age groups. Also, techniques for changing the attitudes and behavior of children and adolescents were not effective because most social change theories had been developed from work with adults and, thus, did not consider developmental factors adequately.

Within this historic context, other factors were influencing the scope of research on the prevention of drug abuse.

CAVEATS INFLUENCING THE SCOPE OF DRUG ABUSE PREVENTION RESEARCH

First, prevention research on drug abuse has focused almost exclusively on adolescents between the ages of 12 and 18, the years of highest risk for initiation into drug use. This age populatlon has been approached primarily through the school system. Because the focus has been on prevention of initiation of drug use, the drugs studied have included tobacco, alcohol, marijuana, the hallucinogens, and "uppers" and "downers." Heroin

is rarely mentioned because its users tend to be persons already deeply involved with drugs. PCP and cocaine are rarely mentioned because they are recent additions to the pharmacopeia of adolescents.

In drug-related research, developmental stage has been a term more frequently applied to stages of drug abuse than to stages of human development. These two fields of research have been developing independently. Research on the stages of drug use has tended to employ panel study designs using self-report instruments and large samples with data collection on longitudinal studies separated by relatively long intervals, e.g., 2 to 3 years. Research on human development has tended to use small samples, ongoing data collection using third party observations and developmental assessments, and study processes involving subtle factors not amenable to large-scale studies or self-report instruments. Investigators in each field tend to disagree on generalizeability, statistical procedures, and on conceptual and theoretical grounds. Each needs the other, however, and this is clearly evident in the problems facing preventive intervention programs.

In intervention research, the youthful subjects are at varying stages of human development (e.g., for cognitive and psychosocial reasons, they may not be able to comprehend nor apply health or drug messages to their own lives) and they are at varying stages of autonomy affecting drug use (e.g., use of medicines, presence of alcohol, tobacco, and other drugs in the home, and the influences and availability of psychoactive substances in the community and at school). Information is needed on how to deal with such ingroup variations, on how children develop their health belief systems and health practices, and how to communicate with them in accordance with their individual needs and developmental level.

Despite the diversity of drug use patterns and the limited utility of the initiation of drug use as a criterion for drug abuse, etiologic research on drug use has sought unified theories to explain initiation, experimentation, and abuse of psychoactive substances based on family, peer, and evironmental influences. Each of these types of involvements with drugs may have different sets of influences and the impact of different influences may vary depending on the developmental status of the individual or dominant influence group (family, peer, environment, or ethnic group, and socioeconomic status). Many theories, rather than a unified theory, may be needed to reflect differences in populations. Also, a theory embracing many elements may be needed to reflect population differences.

Etiologic research on drug use has sought to identify risk factors to launch intervention programs directed at specific high-risk populations and to identify traits amenable to modification to reduce risk of drug abuse. Such risk factors may not be consistent across groups and they may derive from historic

cohort influences, economic conditions influencing expendable income, availability of particular drugs, or lie outside the mandate of NIDA, such as addressing poverty or changing the mores of cultural groups. Timely epidemiologic and etiologic studies on children and youth are needed if interventions with specific cohorts are to be effective.

Prevention research on drug abuse has sought to identify precursors of drug abuse which are discrete and which represent particular foibles different from antisocial behavior, psychiatric symptomatology, and physiologic vulnerability to drug dependence. Actually, this search for discrete precursors has been cyclical--based on social conditions, development of new technologies for identifying and measuring the presence of drugs in the body, the philosophies of science and clinical practice in vogue, and program incentives which encourage or discourage collaboration among disciplines and research sponsors. From a scientific standpoint, however, many questions arise. Does antisocial or deviant behavior result from or lead to drug use? In studies to identify precursory risk factors, are the variables assessed meaningful, or are they just those which can be readily identified? Also, are some of the variables which appear to be so strongly correlated really measures of different traits or do they measure the same traits under a different guise? To what degree is behaviorally or psychodynamically orlented etiologlc research limited by technological developments to identify persons vulnerable to physiologic dependence or to identify drugs with characteristics leading to dependence? Some persons who use drugs thought to generate physical dependence do not develop drug dependency. Is it appropriate to use DSM-III diagnostic criteria for prevention research on drug use which thus assumes a pathologic model for drug use? The prevalence of drug use among apparently healthy adolescents and young adults Indicates a need for screening and measurement criteria which can differentiate among types of users, developmental vulnerabllities (e.g., drug use in very young children or children with poor self-regulatory mechanisms), psychopathology, and pathogenic aspects of drug use. The motivations for drug use and impact of drugs on the developing person may be radically different based on age and maturation of the individual. Degree of drug involvement, severity of consequence, and degree of rational control over drug use by the individual are open questions in prevention research. Some understanding exists of the extremes of the drug use spectrum--initiation and dependence--but less is known about the intervening processes.

The ubiquitous presence of drugs and drug use which can be legal or illegal, based on the individual's age and the type and source of the drug, also raises questions. What are the effects of external forces such as labeling a child as delinquent if apprehended with drugs? Also, arrests show up on the child's juvenile and school records and affect research results (e.g., the child is labeled delinquent or said to exhibit antisocial behavior based on this involvement with drugs). Depending on a

myriad of factors, law enforcement can be placed in untenable positions regarding juvenile offenders. These factors need to be considered in etiologlc research.

Drug abuse preventive intervention programs have evolved from the need for action and the need to reach the target school-aged population. The result is a heavy reliance on school systems, use of academic time, and involvement of educators in implementation. The types and scope of research is limited by this institutional link. Data collection is limited by the need for active consent by both child and parent and the school. This limits the populations which can be studied and the questions which can be asked regarding drug use, both illicit drug use and use of drugs in the home by other family members. Also, children known to be high risk--such as children of parents with alcohol and drug problems--cannot be singled out in school-based programs. Because of the mobility of families and the short time span of research to evaluate the effectiveness of intervention programs, outcome measures have only been able to address global delay in onset of drug use with the group sample as the unit of measure. School-based intervention programs tend to rely on the development of cognitive and decision-making skills and behavior modification. Few programs have been implemented to work with elementary or preschool children, although some family and personality traits which appear at very young ages have been identified as precursors of subsequent drug use, at least initiation of drug use.

Drug abuse prevention and intervention studies outside the school are rare. Interventions oriented toward families tend to select participants based on criteria that at least one parent or sibling already exhibits drug-related problems. Little research has been done regarding other potentially high-risk youth, such as children subjected to child abuse and neglect, children and adolescents in foster care, single teenage mothers and their children, school dropouts, and unemployed youth. These populations also include a high proportion of minority youth.

The NIDA-sponsored household surveys of drug use and the Monitoring the Future program remain the leading sources of information on drug use trends in the United States. Information on children age 12 and over is available only on those children residing in the households sampled. Monitoring the Future surveys high school seniors, thus excluding school dropouts. In the 1984 Interagency Conference on Child and Family Statistics (Zill et al. 1984). which involved all Federal agencies collecting data on families and children, the major problem was lack of information on children: some information exists on children 12 to 18; almost no information on children from infancy to age 12. The reason for these gaps in data between birth and adolescence is the problem of acquiring information from or about children. As an example, parents do not serve as good respondents regarding their child's behavior away from home. Parents rarely know what their child had for lunch (Davidson and

Kandel 1981). This leads to an area of investigation offering great promise: the health promotion movement.

Although we know little and can ask children very little about their contact with drugs, ranging from alcohol to illicit drugs, health promotion research has begun to investigate how the child develops an orientation toward health beliefs and health-related behaviors. Because of the positive stance of such programs, they are not subjected to some of the limits set on research and interventions aimed at illicit substances. Investigators can ask questions relevant to use of medicines, consumption patterns in the home, role models, sources of information for the child. and the autonomy a child has in making decisions on factors affecting the his or her health. Many of these factors are potential precursors to subsequent drug use. These health promotion programs offer models for drug abuse prevention programs and useful questions for etlologic research.

Touching on some sensitive topics for drug abuse prevention research, parents, concerned about the welfare and futures of their children, have looked at the media, laws and law enforcement, and other people's children for causality and solution of drug problems. Despite the consistent findings that modeling of drug-using behaviors is a significant influence leading young people into acceptance of drug-using behaviors in their environment, responsible adults of almost all persuasions point to youth in the community as the primary target for preventing epidemics of drug abuse. Although prevention research in mental health and substance abuse on low socioeconomic status populations targets environmental influences, failures In parenting, family management, and failure of the child to develop along a maturational trajectory leading to competence and economic stability, prevention research concerning persons in the upper two-thirds of the socioeconomic spectrum has turned away from the more powerful middle-class adult to focus on adolescent peer groups without asking why the child may select certain friends and influences while rejecting others. The reasons are obviously very complex, as indicated by the bimodal nature of results of studies measuring parenting, personality traits, school performance, conventionality, competence. etc. For example, risk for drug use can be associated with both high achievers and low achievers in school. A closer look may reveal that intellectual precocity of a child can be a risk factor because the child associates with older, and perhaps drug-using, peers without the psychosocial competence to cope with the social situation. On the other hand, the low achiever may have fallen behind in school, have developmental lags, and may be protected from drug exposure because of association with younger and less experienced peers. Also, high achievers may be more exploratlve; low achievers, less so.

An additional point warrants comment. All participants in this RAUS review agreed that reference to drug use as "normative" or "normal" among adolescents could be misinterpreted as meaning

free from disorder or pathogenic characteristics. The pervasive availability and use of drugs by young people is normatlve in the statistical sense, but its place In the adolescent repertoire of behavior is no more "normal" than the reckless driving, streaking, or swallowing of goldfish in former cohorts of teenagers. The attribute which appears to underlie all such behavior is the self-testing, explorational excitement of adolescence which involves risk-taking behaviors and experimentation.

In effect, from infancy and the child's first step, risk-taking is a component of human development leading, hopefully, toward mastery and competence at a higher level of development. The dilemma of trying to extract implications of etiologic research for preventive interventions on drug abuse is how to support the growth-enhancing aspects of exploration and mastery while simultaneously reducing or eliminating health and growth-endangering risk-taking involving psychoactive substances. Viewed within a human developmental perspective, one cannot assume that drug use is an expectable outcome of adolescent experimentation with lifestyle and drive for independence.

TASKS AND RESPONSES OF THE RAUS PARTICIPANTS

The RAUS review and these proceedings, in effect, follow a developmental progression from early childhood to young adulthood with topics ranging from human developmental issues related to drug use and the health promotion movement to preventive interventions with young children and adolescents, current patterns of drug use by adolescents and young adults, and differences found among drug users based on age of onset. The authors were asked to discuss their theoretical base, their research or intervention with a specific age group, and the implications of their work for future etiologlc research.

Dr. Diana Baumrind, in her paper, "Familial Antecedents of Adolescent Drug Use: A Developmental Perspective," was asked to consider the impact of early childhood and preadolescent socialization experiences on adolescent drug use from a developmental perspective, based on both a review of theories of child and adolescent development and her own Family Socialization and Developmental Competence Project. Her review of the processes defining adolescent development indicates that risk-taking behavior, which from an adult perspective may be troublesome and deviant, is characteristic of competent adolescents. Her longitudinal study is particularly valuable because it presents aspects of drug-using behaviors and rational abstinence among competent, middle-class youth currently entering midadolescence. Implications of her findings regarding development of the child's sense of social responslblity have clinical relevance for the design of intervention programs and the need of these programs to respond to the values of adolescents: independence versus slavish adherence to peer pressure; health and attractive body image when the children are

vulnerable to fears about the rapid changes in their bodies and moods; and natural highs from physical and. mental experiences which support the development of competence, sklll, and maturation. Although her longitudinal sample is small, her theoretical and interpretive contributions are powerful and thought provoking. She questions the use of "developmental" when referring to drug use, questions problem behavior theory, and raises questions about developmentally regressive demands often placed on young people with drug abuse problems which run contrary to the adolescent's developmental needs to develop critical judgment and independence.

Drs. Patricia Bush and Ronald Iannotti, in "The Development of Health Beliefs and Attitudes toward Substances," were asked to review the health promotion research literature to identify factors which influence the child's developing belief system about health practices and the use of medicines and abusable substances. Their review of prevention models developed in child and family preventive medicine provides models for drug abuse intervention with elementary school age children and models for conducting epidemiologic studies regarding children. with the children and their families both participating as respondents. They report findings from their own work and analyze the four most influential models and variables that guide research on the health behaviors of children. The work, although on a different theme from that of Dr. Baumrind, is also firmly grounded on the developmental stages of childhood. These models include Cognitive Development Theory, based on Piaget's stages of children's causal thinking from preoperational patterns, which tend toward the magical (3 to 6 years), to formal operational thought patterns when the child can think abstractly and comprehend time and causality (about 12 years and over); Health Belief Model, adapted from research involving adults' use of health services, which addresses questions of the autonomy a child has to make decisions about health and to influence the behavior of others in their behalf; Social Learning Theory, based on the gradual acquisition of behaviors and the positive and negative reinforcers for the behaviors; and Behavioral Intention Theory, which introduces behavioral intentions. Their conclusions indicate that the different conceptual systems appear to be appropriate in work with children of different stages of development, and that any efforts which ignore the child's developmental stage of comprehension--and the fact that comprehension on health information may lag behind other cognitive areas--will not be productive.

Dr. David Hawkins and his colleagues, Ms. Denise Lishner and Dr. Richard Catalano, were given the task of reviewing the theoretical perspectives underlying commonly utillized prevention approaches with young children and relating these to etiologic research findings. Their paper, "Preventive Interventions with Children," starts with the question of what we are seeking to prevent and continues by discussing childhood predictors, the etiology of drug involvement, and implications for primary

prevention strategies. They attempt to integrate early predictors and correlates of substance use into a comprehensive theoretical framework, and then assess how preventive interventions now being implemented address the etiologic risk factors identified. This comprehensive review highlights the tremendous range of variables brought into play in both the etiology and prevention of drug abuse.

Drs. Milton Shore and Stanley I. Greenspan served as discussants on the early childhood portion of the proceedings. Dr. Shore's analyses give some confidence that drug abuse prevention research is coming to terms with human development research and theories on the development of drug use behaviors. He argues that debates regarding stages in drug abuse may be academic because mere temporal order does not give cause to support a stage theory when environmental factors may have more explanatory power. He expresses grave concern over the lack of conceptual developments regardlng the many factors identified as correlates of risk of drug abuse cited in the research reviewed by Hawkins et al. Dr. Greenspan proposes a long-range research strategy and presents evidence in support of developmental vulnerabilities a child can acquire in infancy and early childhood, such as poor self-regulatory mechanisms, which are precursors to risk factors and traits identified in persons with drug abuse problems.

Moving into the late adolescent and young adult portions of the RAUS review, Dr. Lloyd Johnston uses data from the Monitorinq the Future program in his paper, "The Etiology and Prevention of Substance Abuse, What Can We Learn from Recent Historical Changes." He reports on changes in drug use patterns occurring since the early 1970s. Based on these high school senior surveys and one longitudinal panel, he is able to document shifts in health beliefs, attitudes toward drug use, and changes in life-style values. Dr. Johnston states that, although the peak years for initiation into drug use and drug use per se still reside in the late teens, the trend shows an overall decline in drug use and an increase in the percent of adolescents who are discontinuing their use of drugs as they move into young adulthood. His assessment of reasons for reductions in drug use indicates a trend toward more conservative values and lifestyle which may open an avenue for prevention efforts based on providing credible drug information to youth from sources and authorities young people are beginning to find acceptable. Dr. Johnston and others at this RAUS review felt that the anti-establishment feelings of earlier cohorts of youth and the scare tactics used in earlier information campaigns were both major causes for failure of earlier prevention efforts.

Based on data from the St. Louis Epidemiological Catchment Area Project, Drs. Lee Robins and Thomas Przybeck were asked to identify factors which differentiate risk of drug use from drug dependence among adolescents and young adults and to analyze the relationship between drug use and abuse with other behavioral problems and psychiatric disorders. In "Age of Onset of Drug Use

as a Factor in Drug and Other Disorders," they state that the clearest predictor of developing serious consequences from drug use is early age of onset. Of persons whose drug use began before age 15, half met the criteria for drug disorder before the age of 25. Although inltlatlon into drug use subsides after age 18, those persons who did initiate drug use in their twenties evidenced higher rates of internalizing psychiatric disorders (e.g., depression, dysthemia, and phobias) indicating that perhaps undiagnosed and underlying psychiatric problems led these persons to attempt to self-medicate through use of drugs. Persons initiating drug use before age 15 had early anxiety and depressive symptoms. In effect, results were bimodal: those beginning drug use before 15 and after 25 tended to develop the most severe drug problems. Only one factor, underachievement before age 15, was protective against drug abuse. Getting drunk was the most powerful precursor of drug use in every age bracket; race was unimportant; broken homes were less important than the child's own behavior; and the development of drug problems was less predictable than the occurrence of first use.

Drs. Denise Kandel and Kazuo Yamaguchi were asked to review the periods of risk for initiation of different classes of drugs and to analyze the sequential relationships among use of the different substances, based on their longitudinal panel study of persons now In thelr early twenties. Dr. Kandel's statistical model, which she stated she developed because of peer pressure from her research colleagues, used a hazard function analytical design which permits the analyst to identify patterns within a brief interval of time even If the overall longitudinal design uses longer intervals between data collection. Their findings indicate that only 25% of those who have ever tried illicit drugs (other than marijuana) are still using them at age 23. An interesting phenomenon they report is that, as the use of other drugs declines in the midtwenties. an increase occurs in the use of medical prescriptions for psychoactive drugs. The authors see clear temporal developmental stages of drug use: the use of licit and illicit drugs from adolescence through young adulthood, with the use of medically prescribed psychoactive drugs identified as a further step in the sequence. The existence of sequential stages of progression does not necessarily imply causal linkages among different drugs.

Drs. David Murray and Cheryl Perry, in their paper "The Prevention of Adolescent Drug Abuse: Implications of Etlological, Developmental, Behavioral, and Environmental Models," were asked to review the contributions of etiologic research to the development of prevention programs, including their Amazing Alternatives preventive intervention program in Minneapolis. Their synthesis of the theoretical base for interventions with adolescents and identified risk factors led them to provide junior high school children in their program the opportunity to identify what functions drug use may play in their lives and to develop alternative activities which accomplish the same or similar functions. The program is predicated on

participatory management by the young adolescents and commitments they contract to uphold with their group members. As with most such programs, this program is currently undergoing evaluation on which results are not yet available. However, from their overall review, they conclude that social, environmental, intrapersonal, and behavioral factors are interacting determinants of future drug use and are the appropriate foci of prevention proqrams.

Dr. Richard Jessor was given the task of "Bridging Etiology and Prevention in Drug Abuse Research." He accepted the gauntlets provided by Dr. Baumrind's comments regarding problem behavior theory, and those of Dr. Johnston regarding potential for use of drug information with the new generation of adolescents, as well as Dr. Kandel's stage theory of drug abuse. Dr. Jessor also felt that risk factors identified in childhood were too separated in time and interceding variables to be applicable to adolescent behaviors such as substance abuse. One is left with the rich array of data and theories and the awareness of the complexities involved in prevention research in drug abuse.

The final chapter synthesizes the themes and implications which can be drawn from this RAUS review--what we think we know and what we now know that we don't know--and discusses their implications for future etiologic research and interventions to prevent drug abuse.

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Familial Antecedents of Adolescent Drug Use: A Developmental Perspective

Diana Baumrind, Ph.D.

My assignment is to consider the impact of early childhood and preadolescent socialization experiences on adolescent drug use from a developmental perspective. First, I will review the processes defining normal adolescent development and then present findings on the preadolescent phase of the Family Socialization and Developmental Competence Project. Analyses of data on the adolescent phase of this project have not yet been completed; however, analyses we have completed are of interest because they do not support the presupposition that adolescent drug use arises from pathological personal characteristics or pathogenic socialization practices, or that use of such illegal substances as marijuana is deviant behavior for adolescents. These analyses do not address the important question of whether such use is pathogenic.

PROCESSES DEFINING NORMAL ADOLESCENT DEVELOPMENT

I will begin by reviewing the processes defining adolescent development in order to show that risk-taking behavior, which from an adult perspective may be troublesome and deviant (Jessor and Jessor 1977), is characteristic of competent adolescents. Ages 10 to 15, which are often used to bracket early adolescence, correspond to the ages of children attending middle schools and junior high schools in the United States. The concept of psychosocial adolescence implies, in addition to the accelerated physical changes of puberty, identity formation as the outcome of adolescent crisis. Identity formation, according to Erikson (1959), is the outcome of adolescent experimentation with different lifestyles, resolution of bisexual conflicts, and emancipation from childhood dependency, eventuating in crucial decisions concerning school, love, and work. Adaptive risk-seeking behavior is a component of the adolescent crisis that results in identity formation, by contrast with what Erikson calls a "foreclosed identity."

Adolescence is a period of development involving transitions in the major physical, intellectual, psychosocial, and moral processes that make up a person. Transitional stages of development are by definition periods of disequilibration and disruption, and, therefore, replete with opportunities for experiences that are both dangerous

and growth-enhancing. In order to progress from one developmental stage to the next, a disequilibrating conflict must occur which motivates the individual to abandon the comfort of a well-integrated stage of reasoning or lifeview for a new and, therefore, less secure stance. The adolescent identity crisis is such a disequilibrating conflict during which adolescents question the heretofore accepted values of their parents and other adult authorities before arriving at a set of principles capable of reconciling the disparate points of view characterizing their own and their parents' generations.

During the adolescent transition, many youths engage in socially disruptive and health-endangering behavior. However, most adolescents who experiment with drugs or other health-compromising and illicit practices do not escalate their worrisome behavior. The concern of health policy planners should be especially with those adolescents for whom risk-taking behavior fails to promote personal initiative and a responsible lifestyle, We need to know why some adolescents become intensely committed to such health-compromising behavior as habitual use of harmful drugs, whereas most who experiment desist on their own. A longitudinal research design employing data-intensive assessments prior to, during, and after the adolescent transition is required to identify consequences of various risk-taking behaviors thought to endanger health, so that distinctions can be made between stage-appropriate, if worrisome, experimentation and involvements for which secondary gains in growth enhancement do not compensate for the short-range turmoil and danger.

I will discuss in turn the following processes that define adolescent development: attainment of formal operational capacities; transition of conventional to principled morality; increased importance of peer relative to family as a socialization context; increased self-centeredness joined with enhanced role-taking ability; and, finally, jeopardized self-esteem.

The adolescent's attainment of formal operational capacities represents both an opportunity and a danger. The adolescent is cast into a limbo between the literal, safe realities of childhood ruled by simple laws of consistency and fairness, and the complex, indeterminate realities of adulthood in which what is and what ought to be may be seen as disparate. The social matrix in which adolescents construct their reality is still malleable, so that dissatisfaction with the status quo may be countered by positing the possibility of a "better life." Liberated from their concrete, confining childhood construction of reality, and awakened to the imperfection and hypocrisy of the adult world, developmentally mature adolescents will characteristically reject some of its values as part of the process of emancipation.

Important transitions in attitudes towards social convention occur during adolescence. Turiel (1978) identifies seven levels of social-conventional concepts through analyses of subjects' responses to a probing (Piagetian) clinical interview. Prior to ages 12 or 13, adherence to adult-oriented social conventions is based on concrete rules and authoritative expectations. Later, with the transition to Turiel's fourth stage, young teenagers typically come to question the

justification of arbitrary authority and social expectation as bases for following convention. A developmental transition from conventional to principled morality may take place, resulting in what Kohlberg and Gilligan (1972) refer to as "cultural relativism." Conventions that serve to maintain the dominant social order, but which are not seen as intrinsically good (e.g., dress codes), tend to be viewed as arbitrary, and therefore rules or laws supporting such conventions are asserted to be invalid. In giving up a heteronomous view of parental authority as absolute and unquestionably valid, adolescents typically do not develop a negative identity which totally rejects parental values en masse. Instead, the form that adolescent negation of convention takes usually expresses simultaneous emulation and rejection of parental standards. For example, in emulation of their elders, adolescents use drugs to assuage immediate or anticipated discomfort, and, in rejection of their elders, they seize upon certain drugs of which their elders would disapprove. The use of illicit substances offers young adolescents the unique opportunity simultaneously to rebel against the rules their elders set down and to conform with the underlying attitudes which parental behavior manifests. By about age 16, with the transition to Turiel's fifth stage, systematic concepts of social structure typically emerge and adult-supported conventions are once again affirmed—now, however, justified by their regulative function.

Beginning in early adolescence, the peer group becomes increasingly significant relative to the family as a socializing context. The transmission of values from parents to children is supplemented or supplanted by values constructed in the peer setting. Parental practices that change in the direction of greater independence-granting will be beneficial to the development of competence following puberty, since such practices take into account adolescents' new capacities. Adolescents in the process of attaining formal operations will be capable of engaging in a social process of value construction and legitimation in the peer setting. However, adolescents may engage instead in an uncritical assimilation of peer norms that merely displace parental norms without contributing to the development of a truly reflective autonomous morality. Therefore, adolescents should be encouraged to develop their critical faculties so that they may use them to critique, rather than slavishly conform to, popular but health-compromising peer practices, even though critical adolescents are more likely to challenge and disequilibrate their parents as well as their peers.

In the past two decades, dependency on peers relative to parents for security and approval has Increased as a result in part of withdrawal by parents from the lives of their youngsters (Bronfenbrenner 1972). Adolescents, even those who are relatively autonomous, typically comply with peer standards up to a point to achieve status and identity within the peer group. In 1961, Coleman observed that leading social cliques among adolescents tended to discourage academic strivings, and this fact may not have changed substantially in the past 20 years.

Superior school achievement may still reduce rather than enhance one's popularity with peers (Gordon 1972). But status within the

larger society, including educational aspirations and occupational plans, remains the province of parents (e.g., Douvan and Adelson 1966; Brittain 1968). While parents' traditionality may prevent early adolescent drug use altogether, and closeness of the parent-child relationship may help shield adolescents from consolidating (but not necessarily experimenting with) the more serious forms of drug use, parental influence probably stops there. Once the adolescent has decided to use drugs, the impact of the experience may be influenced largely by the social clique which socializes the drug-using experience. Thus, in Kandel's study (Kandel et al. 1978), by far the best predictor of illicit drug use was the school the subject attended, suggesting that the school climate is a major contributing influence on children's drug-using behavior.

Early adolescence is a period of heightened consciousness of self and others, resulting simultaneously in increased self-centeredness and in enhanced ability to understand the perspective of another. Adolescent body narcissism, which also occurs at this time, can be put to good use in designing health-enhancing programs. Adolescents tend to be hypochondriacal and are often willing to undertake major changes in lifestyle when convinced that there is a clear and present danger to their health.

Self-esteem appears to ebb at 12 or 13 years of age, with a resurgence during late adolescence (e.g., Bachman et al. 1971; Nickols 1963). Dramatic discontinuities in body image occur as a result of pubertal changes, so that youngsters may actually be less physically attractive at precisely that time at which their awareness of self and others is developing. The low point in self-esteem in early adolescence coincides with entry into the larger and more impersonal world of middle school, which threatens the special status conferred by the family to the younger child by virtue of family membership alone. The adolescent's self-devaluation may be very painful because young people typically lack the perspective to realize that their suffering is developmentally normative and temporary. Moreover, high-achieving youngsters may be especially susceptible to the loss of self-esteem brought about by a change in importance to them of peer relative to parent reference groups and by the fact that peer approbation is based less on high academic achievement and more on conformity with exactly those peer standards which high-achieving youngsters may be reluctant to adopt.

From a developmental perspective, and because of their protected status, *adolescence is the stage-appropriate period to learn how to tolerate pain. However, many early adolescents are motivated to escape from developmental disequilibrium in favor of stasis and harmony and may retreat into regressive patterns of behavior, some of which, like anorexia, are life-threatening.* Alternatively, adolescents may become phobic and thus refuse to deal with stress, or they may self-medicate in an attempt to alleviate their suffering. The high suicide rate among adolescents speaks to the depth and extent of this suffering. We need to examine the relationship between self-medication and more serious forms of self-destructive behavior, such as suicide or psychosis. Does self-medication enable some adolescents to cope with stress or does it always prevent the

development of more effective coping strategies and thus decrease self-esteem and a sense of well-being?

ADOLESCENT DEVIANCE

To deviate is to stray from a path or standard. From a developmental perspective, an individual's pattern of behavior is legitimately characterized as "deviant" only when it diverges from the norms of individuals at that developmental stage. There are patterns of behavior appropriate to adolescents which would not be appropriate in toddlers or adults, and although these patterns of adolescent behavior deviate from those of adults, they no more deserve to be regarded as deviant than does incontinence in a 6-month-old or the exploratory and often dangerous behavior of toddlers. Further, we must distinguish between deviant behavior and pathological behavior. As Matza (1969) asserts in his book, Becoming Deviant, a pathology is an untenable variant, untenable in the sense being morbid and not merely troublesome. The transition-prone pattern of behavior that Jessor and Jessor (1977) describe is neither pathological nor deviant.

Data from the Jessors' longitudinal study of high school youth (1977) demonstrate that, as one would expect, normal, healthy adolescents are transition-Drone. The changes that take place in their subjects from the freshman to the senior years define transition-proneness and are, with one notable exception, nonpathological. These changes include puberty; lowered academic achievement values; higher value on independence; increased tolerance for transgressions from adult standards; increased social criticism and political activism; decreased religiosity; increased perceived friends' support relative to parents' support; increased perceived relaxation of parents' standards; lowered reported church attendance; and increased reported drinking, social activism, alcohol use, drug use, and sexual activity. The important exception to the nearly perfect correspondence between responses indicative of normal psychosocial development and transition-proneness is on reported alienation: the Jessors reported developmental decreases in alienation (p. 153) from the freshman to the senior years, but found that higher alienation predicts onset of marijuana use (p. 170). Since "alienation" as a belief structure does not contribute to healthy risk-taking behavior or optimum development, it is, like decreased achievement motivation, but unlike the other transition-prone characteristics which are associated with social maturity for adolescents, a viable targeted behavior for preventive-intervention programs.

Further, we ought to distinguish between health-compromising risk-taking behavior, which is ultimately harmful, and growth-enhancing limit-testing, which is ultimately positive and contributes to optimal competence. By optimal competence, I mean a coordination or integration within the person of the socially responsible and agentic modes of behavior. Agentic, as used in this paper, refers to persons who are doers, or leaders, or who are capable of being agents of change for themselves. Thus, adolescents who embrace the worldview and lifestyle that the Jessors show is associated with problem behavior may be more likely than their peers to engage in

health-enhancing behavior of an active nature, such as aerobic exercise, nutrition monitoring, and cultivations of agentic qualities, and less likely to engage in risk-avoidant, health-endangering behaviors such as a phobic or a sedentary lifestyle. In support of this hypothesis, investigators have shown that the antecedents of experimental or light marijuana use in nondelinquent populations include such positive attributes as independence, friendliness, self-confidence, and intelligence (Hogan et al. 1970; Jessor and Jessor 1978). My early results support their findings.

FAMILY SOCIALIZATION AND DEVELOPMENTAL COMPETENCE PROJECT: PREADOLESCENT FINDINGS

At this point I will digress to summarize our findings with preschool and middle school age children and to describe the Family Socialization and Developmental Competence Project (FSP).

I began my ongoing work on parent-child socialization effects in 1959 with the first of three studies, using as participants Caucasian, middle-class parents and their preschool children enrolled in one of 13 nursery schools in Berkeley and Oakland, California. My objective was to identify the familial antecedents of individual differences in optimal competence in children and adolescents. The hallmark of my research program has been the collection of comprehensive high-quality data obtained from ecologically valid sources, including direct observation in naturalistic settings and intensive structured interviews and observations. With each successive developmental stage, the battery of measures assessing child factors used by the Project becomes more extensive to match the increasingly differentiated status of the maturing child, permitting a correspondingly more differentiated set of substantive issues to be addressed. At Time 3, when our subjects were 14 years old, as at earlier ages, we assessed psychosocial attributes, creativity, and intelligence. Measures were added to assess adolescents' attitudes towards their parents and socio-religious issues and assess their physical and nutritional fitness, pubertal status, and substance use and abuse. Additional parent measures assessed their health and substance use. An intensive interview on moral decision-making was administered to both parents and to the adolescent participant.

The Preschool Period

My three preschool studies (Baumrind and Black 1967; Baumrind 1967, 1971a, 1971b, 1972) were intended to assess the validity of the claims of permissive and child-centered clinicians and educators grounded in psychoanalytic theory and widely (but incorrectly) attributed to Benjamin Spock. The Freudian model at that time—much modified today—derived as it was from a study of seriously ill patients, presumed an infant highly vulnerable to psychopathology and in need of psychological swaddling. Psychoanalytically derived advice was widely accepted, including demand feeding and toilet training within an affective context of unconditional acceptance and permissiveness. My studies were designed to overcome the shortcomings of previous research on socialization effects which had relied upon retrospective reports and an inadequate database and which had

confounded observations of parent and child behavior. For my preschool studies, an observer recorded and later rated the interpersonal and social behavior of the children in nursery school during a period of 3 to 5 months, and administered to each child the Stanford-Binet intelligence test. The entire protocol describing the child's behavior over the school semester and while taking the Stanford-Binet was used to rate each child on 95 items describing social-psychological and cognitive competence using the Q-Sort method of rating to minimize response bias. These items were cluster analyzed. The empirical composites that emerged included friendliness towards peers, cooperation with adults, an inclination to dominate, purposiveness, achievement-orientation, independence, and physical competence. Information about family interaction was obtained from observations in the home and laboratory and from structured interviews as in earlier studies (Baumrind 1967, 1971a). Seventy-five Parent Behavior Rating (PBR) scales representing 15 theoretical constructs were devised to assess the behavior of mother and father separately. Observers' ratings of the 75 items defining the 15 constructs of parenting behavior were factor-analyzed. The major empirical parent composites that emerged included: exerts firm enforcement, requires household help, demands maturity, maintains structure and regimen, responds to child's needs, expresses anger forthrightly, stimulates Intellectually, and encourages independence and self-awareness. Both fathers and mothers were scored on each composite.

In the first study (Baumrind 1967). three groups of normal preschool children differing in social and emotional behavior were identified in order that the childrearing behavior of their parents could be contrasted. Conclusions from that small-sample pilot study can be briefly summarized as follows:

(1) Parents of the children who were the most socially responsible and independent were themselves controlling and demanding; but they were also warm, rational, and receptive to the child's communication. This unique integration of high control and positive encouragement of the child's autonomous and independent strivings was called *authoritative* parental behavior.

(2) Parents of children who, relative to the others, were discontent, withdrawn, and distrustful, were themselves detached and controlling, and somewhat less warm than other parents. They were called *authoritarian* parents.

(3) Parents of the least socially responsible and independent children were themselves noncontrolling, nondemanding, and relatively warm. These were called *permissive* parents.

In a second study (Baumrind and Black 1967), subjects were 95 sets of parents and their preschool children. Behavioral and interview data were analyzed separately for boys and girls, and correlations were obtained between theoretically important parent and child variables. Parental practices that were stimulating and even tension producing (e.g., maternal maturity demands, and paternal abrasiveness with girls) were associated in the young child with assertiveness.

Firm paternal discipline was associated with sex-typed instrumental competence (for girls, with friendly, cooperative behavior and for boys, with independence and self-assertiveness). Restrictive, non-rational discipline was associated with withdrawn, dependent, and disaffiliative behavior in both boys and girls, whereas authoritative, rational discipline was associated with socially mature preschool behavior. These two studies firmly established the positive effects on preschool children of firm parental control in a context of contingent warmth.

The third and most comprehensive of my studies of preschool children also constitutes the first wave of my present longitudinal study, which we refer to as the Family Socialization and Developmental Competence Project. The 134 Caucasian, middle-class children in this longitudinal sample were born in 1964 and were first studied in 1968-69 when they were 4 to 5 years old. One hundred and four (46 girls and 58 boys) of the original 134 families were seen again in 1972-73 when the children were between 9 and 10 years of age. In 1974, an additional 60 families (32 girls and 28 boys) were added to offset attrition and to provide a substantial sample of 164 families for further longitudinal analyses. One hundred and thirty-six of these children and their parents were seen again in 1978-79 when the children were about 14 years of age.

Families were typed on the basis of the patterns of scores of both parents on the parent behavior rating composites to produce contrasting groups of families corresponding to more refined definitions of the Authoritarian, Authoritative, and Permissive prototypes which emerged from the pilot study.

I will summarize results as they pertain to the Authoritarian, Authoritative, and Permissive prototypes, and a variation of the Permissive prototype called Nonconforming.

Parents were assigned to the Authoritarian pattern on the basis of having high scores on the clusters measuring firm enforcement and maturity demands, and low scores on the clusters measuring warmth and psychological differentiation. Children of Authoritarian parents did not have a distinctive profile when compared to all other children in general. However, when children from Authoritarian homes were compared specifically to their same-sex peers from Authoritative homes, boys from the Authoritarian households were found to be relatively hostile and resistive and girls were found to be relatively lacking in independence and dominance.

Parents assigned to the Authoritative pattern, like Authoritarian parents, had scores high on firm enforcement and maturity demands. But by contrast with Authoritarian parents, Authoritative parents were warm and psychologically well differentiated.

Authoritative parents attempt to direct the child's activities in a rational, issue-oriented manner. They encourage verbal give-and-take, share with the child the reasoning behind a policy, and solicit objections when the child refuses to conform. Both autonomous

self-will and disciplined conformity in children are valued by Authoritative parents. They exert firm control at points of parent-child divergence, but do not hem the child in with restrictions intended to prevent the child from engaging in stage-appropriate behavior. Authoritative parents use reason, power, and shaping by regimen and reinforcement to achieve objectives and do not base their decisions on group consensus or the individual child's desires.

Children from Authoritative homes were consistently and significantly more competent than other children. For girls, authoritative parental behavior was associated with purposive, dominant, and achievement-oriented behavior, and for boys, with friendly, cooperative behavior.

By contrast with the previous two types of parents, who are high on firm enforcement and maturity demands, Permissive and Nonconforming parents are less controlling than they are warm and autonomy-granting. The criteria for assignment to the permissive pattern were low scores on firm enforcement, maturity demands, and expectations of household help, and high scores on warmth.

In the Permissive prototype of adult control, the parent behaves in an affirmative, acceptant, and benign manner towards the child's impulses and actions and is available to the child as a resource to be used as the child wishes, but not as an active agent responsible for shaping and altering ongoing and future behavior. The criterion for assignment to the variation of the permissive pattern designated Nonconforming was that both parents scored very high on all the measures of psychological differentiation, i.e., encourages independence and nonconformity, self-awareness, and intellectual stimulation. Nonconforming parents had scores similar to those of Permissive parents in that they were more responsive than they were demanding or restrictive but, by comparison with Permissive parents, Nonconforming parents were less passive, made higher maturity demands, and had better formulated a world view.

Contrary to what traditionalists might expect, children of Permissive and Nonconforming parents were not lacking in social responsibility. However, contrary to what liberals might expect, daughters of Permissive parents were markedly less assertive and independent than daughters of Authoritative parents, and daughters of Nonconforming parents were neither independent nor achievement-oriented. Also, sons of Permissive parents were markedly less achievement-oriented than sons of either Authoritative or Nonconforming parents.

Authoritative parents combining high levels of both firm control and encouragement of autonomy were unique in the consistent positive impact of their childrearing practices on the development of socially responsible and independent behavior in both boys and girls.

Middle Childhood

Presented below are a subset of findings from the longitudinal study at Time 2 when the children were 9 years of age. Results of special interest pertain to the development of nonsexstereotyped social characteristics in these 9-year-old children, in particular social

assertiveness in girls and friendly-cooperative behavior in boys. Family patterns were used as predictors in analyses of variance.

Continuously distributed parent variables were entered in hierarchical multiple regression analyses predicting children's social assertiveness and social responsibility at age 9.

For girls, the positive impact of Authoritative parenting on social assertiveness and achievement orientation is shared, although to a lesser degree, by two other family patterns that are also highly demanding-namely families categorized as either Authoritarian (as described earlier), or Traditional (a pattern in which mothers are warm, and fathers are controlling and conservative). By contrast with daughters from Authoritative families, daughters from Authoritarian families are not friendly and daughters from Traditional families are not friendly or cooperative—thus, these girls exposed to non-negotiated discipline appear to react against, rather than conform to, their parents' demands for conformity. By contrast with girls from these three types of demanding families, daughters from non-demanding families lack social assertiveness. The major familial determinant of girls' social assertiveness at ages 4 and 9 is parental demandingness, which comprises firm control and high maturity demands.

For boys, there are strong positive associations between socially responsible behavior and Authoritative parenting. Positive linear predictors of social responsibility in boys are parents' firm control and responsiveness. Traditional parenting by contrast with either Authoritarian or Rejecting parenting also enhances boys' socially responsible behavior. Social assertiveness in boys is associated with parents' index of social position, self-confidence and use of power coupled with freedom-granting, and unconventionality.

The consistently positive effect of Authoritative parenting behavior on children is apparent at age 9, as it was at age 4. This is true whether the independent parent variables consist of Time 1 or Time 2 measures. The children who are both highly prosocial and highly assertive generally come from Authoritative families. When parents are highly demanding, but less responsive than Authoritative parents, children tend to be socially assertive but not socially responsible.

ANTECEDENTS OF ADOLESCENT SUBSTANCE USE

I turn now to an overview of the adolescent phase of this longitudinal research program. Using our comprehensive database, we plan to identify precursors in early development and parental childrearing practices which will differentiate among adolescents who negotiate their teenage years with varying degrees of success. Our current findings concern the antecedents of substance use in early adolescence.

(1) We have constructed adolescent, but not parent, drug codes. Our categories of adolescent drug use were designed to include qualitatative as well as quantitative factors as definers in order to distinguish among types of users. These categories are presented as

appendix A. The frequency of use for each category is presented in appendix B.

(2) We contrasted rational and risk-avoidant illicit drug (other than marijuana) abstainers using Mann-Whitney U tests, with the expectation that rational nonusers would be more competent, and their parents would be more intellectually stimulating and self-aware. As predicted, rational abstainers (N = 18) were significantly more socially assertive (z = 2.04) and domineering (z = 2.45) than risk-avoidant abstainers (N = 49), and their parents (at Time 1) were more self-aware and intellectually stimulating (z = 2.03). However, these results were significant for girls only. Across-sex, parents at Time 2 were also more demanding (z = 2.21). We then contrasted rational marijuana abstainers (N = 6) and experimental users of marijuana (N = 21) with the expectation that their personal characteristics would not differ but that their upbringing would. That is, it was expected that although both groups would be agentic, parents of rational abstainers would be stricter during middle childhood. The sample size of rational marijuana abstainers was too small for meaningful comparisons of boys and girls separately, and so analyses were done across-sex using Mann-Whitney U tests (N = 27). As expected, there were no early personality differences between rational abstainers and experimenters. Children in both groups are agentic relative to others. However, there were, as expected, numerous Time 2 parent differences: parents of abstainers were more monitoring (z = 2.52), firm (z = 2.15), and demanding of household help (z = 2.11).

(3) We have constructed for the adolescents, although not yet for their parents, two Guttman scales: (a) an "Initial Use" scale of caffeine, alcohol, marijuana, tobacco, and other illicit drugs, and (b) a "Recreation Plus" scale which assesses more than experimental use of alcohol, marijuana, and other illicit drugs. For the six-point Initial Use scale, the Coefficient of Reproducibility is .86 and the Coefficient of Scalability is .61. For the four-point Recreation Plus scale, the coefficients are considerably better; the Coefficient of Reproducibility is .95 and the Coefficient of Scalability is .84. The cutting points (see appendix A) are: recreational use of alcohol (2b and above on D); recreational use of marijuana (2b and above on C); and more than minimal experimental use of psychedelics (2 and above on E) or any use of other illicit drugs (1 and above on F or G). The four-point Recreation Plus scale was constructed from an attempt to discover empirically the best scale inherent in our data. The best descriptive pattern of drug usage is based on cutting points at recreational usage and contains only alcohol, marijuana, and other illicit drugs. The cutting points for the four-point Recreation Plus scale were determined empirically according to the procedure outlined by Guttman (1947), where cutting points within the response categories are selected to: (a) minimize errors in the scales, and (b) never have more errors than nonerrors within a category. When these criteria were used, the best scale was found to have the cutting point at recreational usage and above for alcohol and marijuana use, and for any use of other illicit drugs.

The drug categories to be included were also empirically determined. Caffeine and tobacco were excluded because they lowered the coefficient of scalability whenever they were included, regardless of the cutting point used.

We do not use Guttman scaling to support a stepping-stone hypothesis (O'Donnell and Clayton 1982). Indeed, I critiqued the stepping-stone hypothesis as an exemplar of specious causal attribution Baumrind 1983). Moreover, we do not represent our Guttman scales to be a natural progression that establishes a developmental sequence of adolescent drug involvement (Kandel 1980). Developmental theorists, such as Piaget or Werner, use the term "developmental function" to refer to the form of the relationships between an individual's age and the changes occurring in his or her responses to some specified dimension of behavior over the course of his or her life (Wohlwill 1970, p. 151). In order for a dimension to qualify as a developmental function, it must be unitary and generalize across stimuli and tasks.

In specifying a developmental sequence, according to Wohlwill, the investigator would describe the invariant stage sequences, identifying the discrete steps in their appropriate order and coupled with at least approximate indications of the age intervals corresponding to the appearance of each step. The dimension described by the developmental function would in theory be universal, and in practice be generalizable across a wide range of situations. In stage theory, "necessity" means culturally invariant. It is through the organism's ability to confer a universal significance on environmental events through its own assimilative activity that, according to Piaget, the organism can be freed from complete dependence on a variable environment to structure its actions, thereby enabling it to progress systematically through the sequence of stages he proposes. In establishing the stage-sequentiality of a particular developmental sequence, it must be demonstrated that behaviors characteristic of later stages are transformations of earlier stages of activity. It Is through this relationship of transformation that different structures of activity are viewed as stages in a single developmental continuum, not simply as a sequence of isolated forms of activity (Langer 1989). To the extent that the structure of a domain of behavior is bonded to structures appearing both earlier and later in the course of ontogenesis by relations of necessity, the sequence of attainment of those structures *must* be situationally invariant. To demonstrate only that behaviors emerge at different points in the course of development for a particular sample is not to demonstrate that they are stages in the same developmental process.

In the developmental literature, a Guttman scale is sometimes equated with a developmental sequence of stages (e.g., Fischer 1978). This equation can lead to unwarranted conclusions. A Guttman scale is simply a description of a response pattern at a given moment in time and cannot be extrapolated to past or future times. Drug behavior does not qualify as a developmental function because it is dependent on transient contingent factors. Whereas Piagetian stages necessarily imply a culturally invariant causal relationship, the

empirical fact of a sequence of drug use demonstrated by a Guttman scale analysis Is dependent upon such contingent factors as price, availability, legal sanctions for possession or sale, and social stigma attached to use.

We began our analyses by attempting to replicate Kandel's Guttman scale (1978, 1980) of initial use. We were not successful. Kandel's sequence is: (a) beer and wine, (b) cigarettes or hard liquor, (c) marijuana, (d) other illicit drugs; whereas ours is (a) alcohol, (b) marijuana, (c) cigarettes, (d) other illicit drugs. Only 36% (49) of our subjects had never tried marijuana; whereas 55% (75) of our subjects had never tried tobacco. Whereas only 10% (6) of our subjects who had tried tobacco had never tried marijuana, 37% (32) of our subjects who had tried marijuana had not tried tobacco. In our sample, unlike in Kandel's sample, legal drugs such as cigarettes do not precede illegal drugs such as marijuana. The low use of tobacco relative to marijuana is probably due to the fact that Berkeley had mounted a vigorous antismoking campaign directed towards high school students at the time our data were collected (in 1978-79) and apparently it had been successful. By contrast, adult attitudes towards marijuana use were complacent, if not actually permissive. *A generalization applicable to both samples is that use by adolescents of substances acceptable to the community precedes their use of substances that are strongly negatively sanctioned by the community.*

(4) We then computed linear and nonlinear correlations between the major Time 1 and Time 2 child and parent variables and (a) the six-point Initial Use Guttman scale; (b) the four-point "Recreation Plus" Guttman scale; and finally, (c) the reported age of onset of (i) marijuana, (ii) alcohol, and (iii) tobacco use. Our purpose in these analyses was to determine the direction, rather than the magnitude, of a relationship.

The significant personal and familial antecedents of the six-point Initial Use scale are as follows: For girls, progression in initial use is associated at age 4 with dominance (r = .29), purposiveness (r = .31), and independence (r = .33). Progression is associated at age 4 negatively with familial firmness (r = -.27); and with parents' self-awareness and self-confidence (r = -.28), and positively with encouragement of independence (r = ,32). Progression is associated at age 9 negatively with parental restrictiveness (r = -.27) and conventionality (r = -.44). For boys, progression is associated at age 4 only with physical competence (r = .32). Progression at age 9 is associated positively with social confidence (r = .22), and negatively with familial conventionality (r = -.22) and demands for household help (r = -.25).

The significant personal and familial correlates of the four-point Recreation Plus scale are interesting for girls in that there are no linear relationships, but there are nonlinear relationships between recreational use categories and personal characteristics at age 4 and at age 9. Adolescent girls at levels 1 (no recreational use) and 3 (recreational users of marijuana) were more socially agentic at age 9 than girls at levels 2 (recreational users of alcohol only) and 4

(users of other illicit drugs). Girls who for recreational purposes use alcohol only were strikingly less socially agentic at age 9 than the other three groups (eta = .38, r = -.02). A nonlinear parental antecedent helps to explain this nonlinear relationship between girls' social agency and recreational drug use. Parents of drug abstainers and of recreational users of marijuana monitored their daughters' activities more closely than parents of recreational users of alcohol, or of other illicit drugs (eta = .55, r = -.35); and monitoring is associated positively with girls' socially agentic behavior at age 9 (r = .27). For girls, the linear familial antecedents at both time periods of progression along the Recreation Plus scale are similar to those along the Initial Use scale: Progression is associated negatively at age 4 with parents' self-awareness and self-confidence (r = -.34) and firmness (r = -.26) and at age 9 with their traditional attitudes (r = -.34) and conventional parenting practices (r = -.32). For boys. progression along the Recreation Plus scale is predicted by more variables than progression along the Initial Use scale. Progression for boys is anteceded at age 4 by social confidence (r = .25), and cooperative behavior (r = .24); and at age 9 by social confidence (r = .25), optimum competence (r = .26), friendly behavior (r = .22), and socially mature behavior (r = .25). Associated parental antecedents of progression at age 9 for boys are negative relations with traditional attitudes (r = -.25), and with directive and conventional parenting practices (r = -.29). For both sexes, family disruption at age 9 is related to progression along the Recreation Plus scale (r = .30).

We then examined the direction of the antecedent correlates of age of onset of marijuana, alcohol, and tobacco use for the subset of subjects who were users. The significant correlates are presented below. Negative correlations mean that the variable is associated with early onset, and positive correlations mean that the variable is associated with delayed onset.

For both sexes, there were more parental than personal antecedents of age of onset of marijuana use. There were personal antecedents only at age 4. For girls, the personal antecedents at age 4 of age of onset of marijuana use were physical competence (r = -.45), cooperation (r = -.39), and independence (r = -.38), all of which were associated with early onset; and for boys, only physical competence at age 4 was significant (r = .34). Note that the direction of the relationship of physical competence and age of onset of marijuana use differs for boys and girls. There were strong parental predictors of age of onset of marijuana use, particularly for girls. Delayed onset for girls was associated not with traditionality; instead, it was *negatively* related at age 4 with mother remaining at home (r = -.46); positively related at age 4 to parental firmness (r = .43), responsiveness (r = .40), self-awareness (r = .61), demandingness (r = .58), intellectual stimulation (r = .53), and requires household help (r = .51); and positively related at age 9 with families' index of social position (r = .52) and maintenance of structure and regimen (r = .32). Delayed onset for boys was related to parents' conventionality (r = .31), family intactness (r = .41), and mothers being at home when they were age 9 (r = .28). With boys and girls combined, emotional disability at age 9 *delayed* onset

(r = .20), once again suggesting that the more socially competent children experimented with marijuana earlier.

With sexes combined, delayed age of onset of alcohol use was associated positively with social assertiveness (r = .19). For girls, delayed age of onset correlated at age 4 with mothers not remaining at home (r = -40), and with parents' responsiveness (r = .41) and encouragement of their daughters' individuality (r = .36); and at age 9 with families' index of social position (r = .36) and parental monitoring (r = .34). Age of onset of alcohol use for boys was not associated with any personal correlates, but was associated positively with parents' encouragement of independence and individuality at age 4 (r = .34) and individuation and self-confidence at age 9 (r = .25).

The correlates of age of onset of tobacco use are quite different from those of alcohol or marijuana use. Age of onset of tobacco use is related negatively to dominance (r = -.47) in girls and to purposiveness in boys (r = -.32); the more agentic the child, the earlier the age of onset. For girls, age of onset of tobacco use is related negatively to Time 2 parental warmth (r = -.39), responsiveness (r = -.30), intellectual stimulation (r = -.38), and family intactness (r = -.53), indicating that girls from loving, stimulating, intact homes who do smoke start smoking earlier than their smoking peers from nonresponsive, disrupted families. For boys, age of onset is related positively to the use of negative reinforcement (r = .34).

An early age of onset for all three drugs (tobacco, alcohol, and marijuana) is significantly correlated ($p<.01$) with being introduced to drugs by adults (in almost all instances a parent or close family member), rather than by peers (tobacco, r = .34; alcohol, r = .33; marijuana, r = .45). *In the case of all three drugs, if onset occurred during the early elementary scchool years, the child was generally introduced to the substance by an adult.* During later elementary school and junior high school years, the introducing agent for marijuana and tobacco was generally peers. For alcohol, the introducing agent tended to be an adult rather than a peer; although the number of children introduced by peers, rather than adults, did increase during later elementary and junior high school years.

(5) The exploratory set of stepwise regression analyses I am about to report predict drug-use types derived from the four-point Recreation Plus Guttman scale. (They will be superceded by theory-guided hierarchical analyses using a more complete set of predictors in the event that funds become available for this purpose.)

The independent variables were selected to represent the child and parent domains, at Time 2 and again at Time 1. For example, at Time 2, the parent variables were a) demanding; b) responsive; c) differentiated; d) directive-conventional; and e) monitoring, i.e., the structure and regimen cluster. The child variables were a) social assertiveness; b) social responsibility; and c) cognitive competence. Also included were disjunctive variables assessing whether the family was intact and whether the mother remained at home. The regression design was a simple stepwise analysis for both sexes

together, and where sample size permitted (at Time 2, and for the first regression at Time 1) for each sex separately. In stepwise regressions, the variable with the highest correlation is entered first, then the correlations with the effect of this variable removed are examined and any remaining significant partial correlations are then entered and so on.

The first regression compared nonusers with all others (level 1 vs. level 2 + level 3 + level 4). For both sexes combined, using Time 2 variables, the simple correlations that were significant were directive+conventional (r = -.25) and family intactness (r = -.20). When the regression was conducted, only directive+conventional remained significant, i.e., when directive-conventional was entered, family intactness was no longer significant. For boys and girls combined, using Time 1 variables, cooperation was positively correlated (r = .22) and domineering was negatively correlated (r = -.26) with recreational drug use. However, after the domineering variable entered, the cooperative variable was no longer significant. Thus, the best Time 1 predictor of children's abstention was a domineering attitude towards peers, accounting for 7% of the variance; amiable children were more likely to use at least alcohol recreationally. For girls, the significant simple correlations at Time 2 were monitoring (r = -.28) and mother at home (r = -.38). Both variables made a significant contribution to the equation, accounting for 21% of the variance; both were negatively related to recreational alcohol plus use. For girls, the significant Time 1 correlate was parents' self-confidence and self-awareness (r = -.34). However, once this variable entered the equation, the cooperative variable became significant (beta = -.44), with both variables accounting for 22% of the variance in recreational substance use for girls. For boys, the significant Time 2 simple correlations were directive-conventional (r = -.28) and social responsibility (r = .27), with both entering into the equation and accounting for 14% of the variance. Social responsibility at age 9 was positively related to boys' recreational substance use, and directive-conventional parenting was negatively related to their recreational substance use. For boys, Time 1 domineering contributed negatively (r = -.30), accounting for 10% of the variance in their adolescent use until parental intellectual stimulation entered the equation. Once intellectual stimulation entered the equation (r = .32), domineering was no longer significant. *In sum,* the predictors of recreational use of any drug for sexes combined is amiability; for girls, the predictors are not being monitored and mother working at age 9, as well as parents' lack of self-awareness and child's noncompliance at age 4; for boys, the predictors are parents' nontraditionality and boys' own social responsibility at age 9, as well as parents' intellectual stimulation at age 4.

The second set of regressions compared alcohol-only recreational users with the marijuana plus illicit drug users (level 2 vs. level 3 + level 4). Using Time 2 variables with both sexes combined, the only significant predictor was social assertiveness (r = .29), accounting for 8% of the variance. The recreational users of marijuana and other illicit drugs were more assertive as 9-year-olds than the later recreational users of alcohol only. Using Time 1 variables, only the

analysis for sexes combined could be run, because of sample size. A single parent variable, expresses anger (r = .37), accounted for 15% of the variance, and was a positive predictor of progression to recreational marijuana use. The relationship is in the same direction for both sexes. The relationship is of interest because expresses anger, which assesses parents' use of confrontational tactics, was related strongly in a positive direction to girls' social assertiveness at Time 2, and this in turn is related to recreational marijuana use in adolescence. For girls, the significant Time 2 predictors were social assertiveness (r = .38) and family intactness (r = -.40). Girls who used alcohol and came from disrupted families were also more likely to use marijuana than girls from intact homes. For boys, there were no significant predictors. *In sum,* for sexes combined, progression to recreational marijuana use is predicted at Time 2 by children's assertiveness and at Time 1 by parents' straightforward expression of anger; and for girls, by their social assertiveness and likelihood of coming from a disrupted family at Time 2.

In the third set of analyses, alcohol-marijuana users were compared with alcoholmarijuana-other illicit drug users (level 3 vs. level 4 with levels 1 and 2 dropped from the analyses). Our N here is quite small, particularly for the analyses using Time 1 predictors where only sexes-combined analyses could be run. There were no significant Time 2 predictors for both sexes. However, using Time 1 predictors, parents' self-awareness and self-confidence entered the equation, and was negatively related (r = -.54) to use of other illicit drugs by children using alcohol and marijuana, accounting for 29% of the variance in children's progression. The variable was in the same direction and of similar magnitude for both sexes. There were no significant predictors for boys. For girls, parental monitoring at Time 2 was associated strongly and negatively (r = -.62) with progressing to use of other illicit drugs by girls using alcohol and marijuana. *In sum,* progression to other illicit drugs is predicted for sexes combined with parents' lack of self-awareness and self-confidence at Time 1; and for girls, with lack of parental supervision at Time 2.

The analyses completed so far suggest the following: *First,* there are parental antecedents other than traditionality that can predict adolescent drug use, and these predictors differ somewhat, depending upon the outcome drug variable. For example, in addition to traditionality, family intactness, self-awareness, monitoring, and firmness appear to shield youngsters against illicit drug use. However, none of these variables account for a large amount of the variance in adolescent substance use. *Second,* the parental correlates of illicit drug abstention do not generally coincide with the parental correlates of optimal competence. Thus, restrictiveness (directive-conventionality) is related negatively to boys' social assertiveness at age 9, but positively to abstention from illicit drug use in early adolescence. *Third,* the personal antecedents of adolescent drug use are uniformly positive, indicating that the more socially mature and competent children are more likely to be involved in illicit marijuana use. For girls, in particular, experimentation with marijuana is associated with personal agency and self-assertiveness. Rational non-using girls differ from their risk-avoidant abstaining peers in that,

like experimental users, they are assertive and peer ascendant. The least agentic girls, by far, are those who engage in recreational use of alcohol, but not in recreational use of marijuana or other illicit drugs. *Fourth,* the antecedents differ for boys and girls and should be examined separately by sex.

Finally, we have yet to attempt to explain the relationship for girls between early onset of both marijuana and alcohol use and mothers remaining at home at age 4. In the regression analyses, mothers of abstainers were more likely to remain at home, as one might expect. But for those girls who are not abstainers, the relationship is reversed. My hypothesis is that nonworking mothers of girls who use drugs at an early age are lax, and possibly have indoctrinated their young daughters into alcohol or marijuana use themselves. This hypothesis will be tested in followup analyses.

IMPLICATIONS FOR PREVENTIVE-INTERVENTION STRATEGIES

We have each been asked to consider the implications for preventive intervention. I do so with some reluctance: first, because we have not yet examined the consequences of drug use; second, because we have analyzed only a fraction of the substance abuse data that we have collected; and third, because research results pertain only to what is and not to what *ought* to be.

With regard to my first concern: In my view, the sequellae that differentiate contrasting types of drug users are of greater practical importance than the antecedents, because the breaking points at which these sequellae appear could be used to distinguish between adolescent users not-at-risk and those whose substance use is health-compromising and places them at risk. The developmental trajectories of, for example, experimental, recreational, and habitual users of illicit drugs may have diverged in the early elementary school years. Preventive intervention should be targeted at the early antecedents that generate health-compromising drug-using behavior once the distinctions among types of users have been established.

With regard to my second concern: My study has yet to include as correlates parents' drug use, moral judgment stage scores, or concurrent socialization practices; or adolescents' concurrent personal characteristics, such as their self-esteem indices, moral judgment stage scores, and physical and nutritional condition. We expect all these panels of data to contribute significantly to an understanding of the etiology and consequences of adolescent substance abuse. Indeed, we already know from the comprehensive clinical case history analyses that we have completed that: (1) most parents of adolescents who use illicit drugs heavily are themselves in some distress and use illicit drugs, and many abuse legal drugs, in particular alcohol, and (2) that the adolescent abusers report themselves to be alienated. Also, we have yet to explain the significance and implications of distal associations at age 4 by contrast with proximal associations at age 9.

With regard to my third concern: data can only tell us about what *is* in a particular context; our minds and imaginations allow us to

posit what *should be* or *could be*. Were I to commit the naturalistic fallacy of leaping from what is to what ought to be, I would be forced to conclude that social assertiveness in 9-year-old children should be discouraged because it leads to recreational marijuana use, or alternatively, that recreational marijuana use should be encouraged because it is associated with socially mature behavior. It would be equally fallacious to conclude that conservative values should be encouraged because they are associated with lower drug use.

With these caveats in place, I will now consider the implications for preventive interventions of my developmental perspective and early results on research objectives.

At this point in our understanding of the phenomenon of adolescent drug abuse, our first task is to establish on scientific grounds the kind of substance use we should be trying to prevent. Drug use is not a unitary phenomenon. It is essential to distinguish among *types* of drug users and to identify levels of use that may in fact be harmful or self-perpetuating. By examining the psychosocial, socioeconomic, and medical histories of different types of users, we may be able to develop approaches to treatment or prevention that are appropriate to the specific type of adolescent drug user. Since the great majority of youths do not progress up the ladder from the initial step, whether that initial step is caffeine or alcohol, our concern might more appropriately be with establishing the steps or levels at which harmful *consequences* become evident and with identifying the kinds of potential users likely to proceed beyond that level. The pathways to becoming an experimental user, a recreational user, and a habitual substance abuser may be quite different.

In delinquent subcultures, antisocial aggression or psychopathology antecede onset of substance use; but in middle-class, liberal subcultures, the psychosocial characteristics that antecede onset of illicit drug use do not support a deficiency or deviance hypothesis for the majority of drug users. Since adolescent drug experimentation in our society is neither statistically atypical nor developmentally abnormal behavior, to use a construct such as deviance to apply, for example, to adolescent marijuana use is not only factually incorrect, but may also have harmful consequences. To treat an adolescent drug user as though he or she were generally, deviant may produce a self-fulfilling prophecy by setting into motion mechanisms which shape the user into the deviant image (see Becker 1963). Thus, to enforce the laws against possession of marijuana for personal use would criminalize the adolescent who got caught and confer objectively upon that person a "deviant" or "problem" status.

With good reason, therefore, even those adult authorities who would not legitimize marijuana use by legalizing it hesitate to enforce the law because to do so would label the user as deviant.

The causal and, therefore, the intervention implications of the relationship between early age of onset (<15 years of age) of marijuana use and negative consequences, including use of other illicit substances (see Robins and Przybeck, this volume), are ambiguous for at least two reasons. First, to the extent that use

of psychoactive substances is intentional behavior serving a psychological function, if marijuana is somehow made unavailable, another undesirable "gateway" activity may take its place. Second, because defiant youths are more likely to be early users, and because we lack a compelling rational argument against drug use, we are unlikely to deter youths who are not compliant but are competent and intelligent. With such youths, the fact that a sizeable percentage of people who try drugs will develop dysfunctional usage patterns is not a rational deterrent to an otherwise gratifying activity. Moreover, educational programs attempting to delay onset may have unintended negative consequences by implicitly conveying the message that later use is acceptable. Were this to occur, use of illicit substances would be perceived by many children as a desirable mark of precocity. Also, when socially deviant youths are required to participate in the school setting in peer-led denunciation of activities they value, they are more likely to become alienated than converted.

Although adolescent drug experimentation cannot be classified as pathological behavior, it may be pathogenic behavior. Any use of chemical agents (including birth control pills) could contribute to a morbid condition in a vulnerable developing organism. Regular use of toxic or consciousness-altering substances, including alcohol and caffeine, could potentiate neurophysiological as well as social learning mechanisms and become self-maintaining. In an important article, a group of Canadian investigators (Stewart et al. 1984) offer compelling evidence that opiate and stimulant drugs act on common neurochemical brain systems to generate positive appetitive states that maintain drug-taking behavior. Adolescents, with their acute erotic and hedonic drives, may be peculiarly susceptible to the positive incentive value of drug use; in contrast, the drive-reduction view states drug use is maintained simply to avoid symptoms of withdrawal.

Based on our understanding of adolescent development, in "A Developmental Perspective on Adolescent Drug Abuse" (Baumrind and Moselle, in press), we have developed a *prima facie* case against early adolescent drug use by defending a set of propositions which posit specific cognitive, conative, and affective negative consequences of consciousness-altering drugs, including impairment of attention and memory, developmental lag imposing categorical limitations on the level of maximum functioning available to the user in cognitive, moral, and psychosocial domains; amotivational syndrome; consolidation of diffuse and negative identity; and social alienation and estrangement. We try to show why substance use in childhood and adolescence is of greater concern than in older age groups. Immersion in the drug culture is expected to alter the developmental trajectory of the individual in the direction of lower achievement motivation, greater passivity, dependence on artificial substances to attain a sense of well-being, withdrawal from intense, committed love relationships, and adoption of an external locus of control. If such pernicious effects do occur, they will only become evident over relatively long periods' of time. A complacent attitude towards adolescent alcohol and drug abuse can only be discouraged by hard data demonstrating that certain drugs or amount or kind of use of

these drugs in an organism of a certain kind at a specific stage of development has harmful consequences, A longitudinal program of research is needed, however, to provide credible evidence to support or rebut the hypothesis that drug use alters the developmental trajectory of the user.

Adolescent substance use is not a temporary aberration likely to revert to the low level of the 1950s, any more than contemporary American mores in which it is embedded are likely to revert to what traditionalists regard as a happier time. There are cogent reasons for this trend: (1) Today the gap between puberty and psychosocial maturity is wider than ever before, resulting in a prolonged status of being-in-limbo, which is conducive to all kinds of social experimentation. (2) All social roles are in rapid transition. Generativity through work and procreation are no longer of clear positive value. Without a normatively sanctioned way to negotiate the transition to adulthood, many adolescents may choose a regressive identity based on rejection of adult roles and use illicit drugs in an attempt to remain "forever young." (3) The social role of women has been permanently altered with two possible consequences for drug use: first, to the extent that maternal presence in the home is an essential part of traditional upbringing, the countervailing force exerted by traditional upbringing will be less prominent; and second, young women are likely to engage in increasingly greater risk-taking and adult-disapproved behavior, making them as likely candidates as their male peers for drug use. (4) Finally, as a society, the illicit status of an act has lost much of its vaIue as either a moral or a practical deterrent. Thus, in probing interviews, only four of our subjects gave the fact that marijuana was against the law as a personal deterrent. Abuse of substances, licit and illicit, is so widespread in our present societal context that we might well ask why some adolescents abstain, rather than why most do not.

The psychosocial factors leading to drug abuse that can be effectively altered by prevention intervention may be grouped into two general categories: social deterrents and intrapersonal coping strategies. Nothing in our data suggests that the early intrapersonal coping strategies of adolescent substance users in our sample are deficient (although in delinquent subcultures there may well be such evidence). Therefore, I will focus my remarks on social deterrents. Social deterrents may be persuasive or coercive.

Persuasive deterrents include educational intervention, modeling by high-status role models, and social reinforcement.

Educational interventions should focus on both health and social consequences in an effort to persuade adolescents that substance abuse is likely to impair personal attributes they value. Thus, it would be counterproductive to advise adolescents to become more conforming or more law-abiding, since these are not attributes they value more than pleasure-seeking and peer-approved activities. Attributes that adolescents do value highly include honesty, self-assertion, independence, self-regulation, stamina, intellectual competence, and physical health. Research efforts should examine

the specific consequences of different kinds of substance use. Preventive intervention should attempt to: (1) develop cognitive defenses and behavioral skills in resisting peer pressure; (2) change the prevailing peer mores by labeling substance use as a sign of peer conformity rather than of deviance from adult standards; and (3) promote more healthful transition markers, such as wilderness treks, as alternatives to substance abuse. Adolescents respond positively to solid information that demonstrates the harmfulness of a given practice when that information is presented unambivalently and clearly, but without resorting to scare tactics or exaggerated claims.

Modeling and social reinforcement by high-status role models, such as parents or teachers, may well be a major social influence contributing to adolescent drug use. Indeed, as we have shown, our earliest users were introduced to unhealthy substances by trusted adults. During the 1960s, and indeed until relatively recently, parents and teachers in liberal university communities, such as the one from which our subjects were drawn, tended to adopt a permissive stance towards adolescent drug use. Many gave tacit or explicit approval to drug experimentation. Well-accepted social learning principles suggest that a permissive stance by adults, who in their role as authorities would be expected to disapprove of adolescent drug use, will contribute to its use. Nonreaction by adults under conditions of expected disapproval is interpreted by children as approval. For example, Siegal and Kohn (1959) found that when a child misbehaves and an adult is present and does not express disapproval, non-reaction is interpreted by the child as approval and the future incidence of such behavior is increased. By the same token, it is reasonable to hypothesize that teachers who provide adolescents with information on drug consequences in a complacent manner which appears to be value-free are perceived by adolescents to condone drug use and to discount its possible health hazards.

Persuasive antidrug information as well as coercive community sanctions should be targeted at adults who are in a position to model or reinforce adolescent drug use. Regulations against any kind of substance use, including cigarettes and alcohol, should be enforced on school grounds, and "head shops" should be proscribed because they are an all too visible symbol of adult complacency towards adolescent drug use. In a liberal community, such as Berkeley, unambivalent support by community leaders and school authorities for an antidrug stance may be necessary to legitimate and strengthen the authority of those parents who are prepared to oppose substance use by their children.

Adult interventions that use coercive deterrents targeted at adolescents themselves can backfire because they are developmentally regressive. For example, the Toughlove approach of Phyllis and David York (1980) emphasizes coercive tactics and containment as well as strict enforcement; it is intended as a method of last resort for use by parents whose adolescents are already out of control, to protect the integrity of the family unit and the rights of other family members. The Toughlove approach typically features a unilateral, nonnegotiable contract prepared by the parent that the

adolescent is expected to sign and obey. Punishment for infraction is sure and swift, and can even result in expulsion of the adolescent from the family. Because the extent to which the strategy is effective may reside less in the severity of deterrents than the regularity with which they are enforced, approaches such as Toughlove represent natural experiments in the effects of the coercive deterrent approach. Such approaches should be studied, particularly with regard to treatment goals which may require developmentally regressive behavior in adolescents for compliance and the therapeutic steps which may then be needed to offset the regressive impact of age-inappropriate deterrent methods.

The most ubiquitous finding in the adolescent substance abuse literature is that traditional, conservative upbringing shields youngsters from early exposure to illicit drugs. However, the implications of this finding for preventive intervention are far from clear. While unilaterally dictating a set of rules and firmly enforcing them may be appropriate for young children, or even with adolescents in some cultures, it is not a viable long-range strategy for adolescents in our culture who will eventually have to fill responsible adult roles requiring independent judgment. While at all ages a control attempt by one person towards another results in conflicting psychological forces both to comply and to resist, the forces to resist do reflect a stage-appropriate drive in adolescence towards independence. Latency-age and preschool children are not yet able to differentiate between legitimate and illegitimate authority. However, during adolescence, the contrasting effects of authority viewed by the adolescent as legitimate and authority viewed by them as illegitimate are heightened. Authority viewed by adolescents as illegitimate should have adverse effects on their self-esteem, competence, and identity, as well as on their compliance. During adolescence, the parent-child relationship is transformed from a complementary, asymmetrical reIationship in which the child is subordinate, to a more reciprocal, symmetrical relationship in which the adolescent's mature accomplishments are acknowledged and their criticisms assimilated. What I have termed "authoritative" control (responsive and negotiated) should be viewed by adolescents as legitimate and, therefore, be relatively well-accepted; whereas, "authoritarian" control (status-oriented and nonnegotiated) should be viewed by them as illegitimate and therefore rejected. Close supervision of preadolescents by authoritative parents who make an effort to legitimate their authority did appear to have a deterrent effect on adolescent drug use in our sample. Close monitoring need not be coupled with conservative values, although on a statistical basis it tends to be. Politically liberal and nonreligious parents can, if they choose, also offer such supervision.

However, any preventive strategy that attempts to legislate a return to traditional values or to discourage unconventionality by coercive propaganda in the school setting is morally untenable and would be likely to backfire. Contemporary American society is an open system in rapid transition and not a closed traditional society in which teenagers are expected to reproduce in cyclical fashion the means of production, hierarchy of values, and cultural mores of their parents' generation. The role of parents as socialization agents is

not merely to transmit traditional values and attitudes, but to encourage their adolescents to develop their critical abilities. In an open society, competent adolescents perform a disequilibratory function for their society by acting as critics of their parents' generation. Intrinsic to assuming a socially responsible position is the assumption that one's decisions are consequential by contrast with feeling that one must conform to forces and people beyond one's control (Kohn 1969). Instrumental competencies required by professional or high-level bureaucratic jobs include self-direction, sense of personal agency, internal locus of control, and ambition, as well as affability and postponement of gratification. Childrearing practices that engender these attributes include use of reason, encouragement of independence, high maturity demands, and legiti- mation of authority. The constellation of conservative values associated with adolescent behavior that does not develop critical judgment may be maladaptive in the long run for individuals competent to occupy high-level professional and entrepreneurial or creative positions. Adolescents who lack this orientation towards independence are more likely than their agentic peers to assume jobs which require respect for authority and conformity to externally imposed rules and offer little freedom of action or reason to feel in control. These attributes, typical of working class status, are inculcated by parental reliance on physical punishment and the exercise of arbitrary authority. By contrast, ghetto youth must develop a different set of survival skills in which the type of independence and autonomy that has evolved is intrinsically more health-endangering because the objective risk factors to be surmounted are so formidable. Their survival skills, as Ogbu (1981) and Silverstein and Krate (1975) point out, are the result of early withdrawal of maternal emotional support, parental encouragement of displays of defiant behavior, and inconsistent parental restrictiveness and punitiveness.

While the abuse of substances is clearly not a viable strategy for resolving the identity crisis of adolescents, neither can the avoidance of any form of risk-taking through foreclosure of identity, in which the individual internalizes uncritically the values and behavior patterns of the parent generation, be viewed as an optimal solution for adolescents of any social class. If substance use serves different functions in our diverse subcultures, then pre- vention efforts must be tailored accordingly.

Adolescent drug use today is a conventional and not an exotic practice, and more a recreational than an ideological pursuit. In the 1960s. when LSD became widely available, consciousness-altering drug use functioned as a chemical gateway to an antinomian lifestyle and as a symbol of widespread disaffection with traditional values afflicting adult intellectuals as well as their adolescent offspring. In the 1970s, the ideological support for drug use declined. Throughout the past decade, and continuing into the present, adolescents, including those who use illicit substances, have become more conservative, achievement-oriented, and concerned with earning a secure living. As leading analysts of changing social values, including Yankelovich (1981), have shown, the youth of the 1980s are painfully aware that they face in the decade ahead a hazardous economic environment; they are concerned with prestige and success, as well

as with self-fulfillment, and will not intentionally jeopardize their ability to earn a living. It is no accident that cocaine, the drug associated with young urban professionals (Yuppies), is replacing marijuana or LSD as the "in" drug for affluent youth. It could easily become the gateway drug to more serious patterns of drug use for a future generation.

The most intelligent youth in our high IQ sample were either experimenters with illicit drugs or rational abstainers. Preventive strategies targeted at this type of population of drug-using adolescents must take into account their intelligence and general competence. The rational abstainer capable of critiquing peer mores represents a minority of drug abstainers, most of whom are less socially mature than their peers who have chosen to experiment. Hard facts are still lacking that would give credibility to our efforts to dissuade intelligent youth, such as those in our study, from experimenting with psychoactive drugs and to become rational abstainers instead. Although adolescents today are less defiant than they were in the past two decades, they are still likely to reject the recommendations of adults when those recommendations are seen as mendacious, or in conflict with their stage-appropriate move towards independence.

As clinicians and parents, there is much we believe we know about the harmful effects of youthful substance use that in our role as scientists we cannot show. As scientists, we must base prevention efforts on solid evidence. We have yet to subject to rigorous empirical tests the various hypotheses proposing that adolescent experimentation with psychoactive drugs has dysfunctional consequences. Thus, in my opinion, we still cannot show that regular marijuana use is implicated in a causal nexus which produces drug dependence or a dropout mentality, or lack of motivation to achieve and develop, or cognitive decrements relative to a previous level of functioning. Youths are influenced by adult values that are expressed rationally and by scientific evidence that does not contradict their own experience. The relative success of the recent anti-smoking campaign testifies to the possibility of changing a negative trajectory by widespread dissemination of accurate information that a particular behavior is bad for one's health. In the event that the factual claims underlying the prima facie case we or other investigators have made against adolescent substance use are supported by credible empirical evidence, I believe that many young adolescents could be persuaded to avoid use or reduce drug use which can lead to dysfunction in their lives. One untapped source of such evidence is the introspective reports of adults who as adolescents were heavy drug users but then reentered the achievement-oriented social structure. A systematic introspective account of their reasons for quitting and the substance-related difficulties, if any, that made reentry difficult would be most enlightening, and a persuasive component in an educational preventive intervention.

APPENDIX A

CODING OF ADOLESCENT DRUG USAGE

A. Caffeine

		Average # of Drinks per Day	Milligrams of Caffeine Ingested per Day*
0	Non-User	0 - 2 per Month	Up to 5 mg/Day
1	Occasional User - e.g., will have one when at a restaurant or at a friend's house	Less than 1/2 per Day	6 - 36 mg/Day
2	Regular Light User - Drinks more than 1 caffeinated drink every other day	1/2 up to 1 per Day	37 - 73 mg/Day
3	Regular Moderate User - Has up to 3 per day	1 per Day, up to 3 per Day	74 - 221 mg/Day
4	Regular Heavy User - Averages 3 or more per day	3 per Day or more	222 mg/Day or More

* Based on the average of 1 can of soft drink, 1 cup of coffee, and 1 cup of tea.

B. Tobacco

B1. Level of Usage

0	Non-smokers	May have tried it in the past, but stopped. Does not accept a cigarette when offered one
1	Experimental	Will generally accept a cigarette when offered, and has not determined to stop, but is not a regular user
2	Current Regular Light Smoker	Less than 1/2 Pack per Day
3	Current Regular Moderate Smoker	Between 1/2 - 1 Pack per Day
4	Current Regular Heavy Smoker	1 or More Packs per Day

B2. Status (Classifies users according to their smoking history)

0	Never Smoked Tobacco	Has smoked less than 3 cigarettes in lifetime, and does not smoke now
1	Used to Smoke	Used to smoke, but has given it up and will not accept a cigarette if offered one
2	Currently a Smoker	Smokes at least occasionally

C. Marijuana/Hashish

C1. Lifetime Usage:

0 = 0
1 = 1 - 5
2 = 6 - 9
3 = 10 - 19
4 = 20 - 39
5 = 40 or More

C2. Marijuana/Hashish Qualitative Scale:

1. Non-user

1a. Rational Abstainer
(a) Can justify abstinence and the reason given is a real deterrent.
(b) Makes reference to an abstract principle (e.g., marijuana use is bad for society because it is a drain on a community's resources).
(c) Child abstains from marijuana use even though s/he is under strong pressure (from peers, sibs, or parents) to use.

1b. Risk-Avoidant Abstainer
(a) Makes reference to a concrete reason (e.g., makes me sick, is bad for me).
(b) Makes reference to a low-level moral reason (e.g., I'll get into trouble, my mom would kill me).
(c) Simply states that marijuana use is against the law (without adding reasons why laws should be obeyed).

2. Light User

2a. Experimental User: Experimented 1-9 times out of curiosity, and may continue to do so, but M/H is not an integral part of social life nor used to self-medicate.
2b. Recreational User: Limits use to parties or weekends - not more than 2x per week.

3. Regular User

3a. Regular Moderate User: 3x per week or more; but seldom during school hours and is generally responsible about use.

3b. Heavy Regular User: Habituated, addicted, or abuser; 3x per week or more.

D. Alcohol

1. Non-user*

1a. Rational Non-user: May have tried sips of alcohol a few times with family or friends, but does not currently use. Has principled reasons for abstinence. (See Illicit Drug Use Scale.)

1b. Non-user or Minimal User: Does not use on a regular basis, but may occasionally try alcoholic beverages with friends and/or family. Plans to continue such usage.

2. Light User

2a. Family User: Drinks only in the family or church setting, for ceremonial or cultural reasons. Light use only. (Heavier family use is coded below.)

2b. Recreational User: Drinks with friends (or a parent who acts as a buddy) at parties and social events. Mostly weekend use. May also engage in ceremonial use with parents.

3. Regular User

3a. Regular User: Uses alcohol as a reaction to stress, or to cope with stress. Drinks alone, or with peers or family on a regular basis. More than just party or ceremonial use.

3b. Heavy User: Habituated; addicted or abuser. Uses alcohol alone or with peers on a regular basis, more than once a week. Some school or work use.

* In our sample, we found only one instance of rational abstinence from alcohol; therefore, the distinction between 1a and 1b was abandoned.

E. LSD and Other Psychedelics (Except for PCP)*

In our proposed coding of Class 1 Psychedelics, including LSD but not PCP, we have divided experimenters into two levels: those who have had virtually no exposure ("experimented minimally") and those whose use, albeit light, has occurred frequently enough to constitute more than a chance happening. The category of "heavy user" was added to tag individuals in our sample who have used these drugs significantly more often than their peers. For these more potent drugs, lifetime usage was employed as one criterion in the coding process on the basis that the effects of these drugs are cumulative.

0	Never Used	0
1	Experimented Minimally	1 - 2 Times in Lifetime
2	Experimented More Frequently	3 - 9 Times in Lifetime
3	User	10 - 29 Times in Lifetime
4	Heavy User	30 or more Times in Lifetime

F. Amphetamines, or Barbiturates, or Cocaine*

0	Never Used	0
1	Experimenter	1 - 2 Times in Lifetime
2	Occasional User	Less than once per week in last month, no more than 9 Times in Lifetime
3	Heavy User	An average of once per week in last month, or 10 or more Times in Lifetime

* Each drug category to be coded separately.

G. PCP, or Opiates**

0	Never Used	0
1	Experimenter	1 - 2 Times in Lifetime
2	Occasional User	3 - 4 Times in Lifetime
3	Heavy User	5 or more Times in Lifetime; or more than once in previous month.

** Any combination of use of heroin, morphine, and/or opium.

H. Other Illicit Drug Use

1. Nonuser - This does not mean total abstention - child may have tried marijuana 3 or 4 times in the past and another 1 or 2 drug(s) once - but is not currently an experimenter or a recreational user.

   1a. Rational Abstainer
   (a) Can justify abstinence and the reason given is a real deterrent.
   (b) Makes reference to an abstract principle (e.g., drug use is bad for society because it is a drain on a community's resources).
   (c) Child abstains from drug use even though s/he is under strong pressure (from peers, sibs or parents) to use.

   1b. Risk-Avoidant Abstainer
   (a) Makes reference to a concrete reason (e.g., makes me sick, is bad for me).
   (b) Makes reference to a low-level moral reason (e.g., I'll get into trouble, my mom would kill me).
   (c) Simply states that drug use is against the law (without adding reasons why laws should be obeyed).

2. Light User
   2a. Experimenter: Does not engage in regular use, but continues to try anything once or twice.
   2b. Recreational User: Limits use to parties or weekends; usually with friends.

3. Regular User
   3a. Regular User: Uses drugs to reduce stress because s/he is stress-intolerant or to relieve achievement-pressure. Self-medicates but is generally responsible about use. DOES NOT USE DRUGS DURING SCHOOL DAY OR WORK DAY.
   3b. Habituated, addicted or abuser: Uses drugs regularly and during school day or work day. Identity is tied to drug use--or can't get through week without it.

APPENDIX B

Frequency of Adolescent Substance Use

		Girls		Boys		Girls + Boys	
		N	%	N	%	N	%
	A. Caffeine						
0	Non-user	15	22.7	9	12.9	24	17.6
1	Occasional User	27	40.9	36	51.4	63	46.3
2	Regular Light User	10	15.2	12	17.1	22	16.2
3	Regular Moderate User	10	15.2	12	17.1	22	16.2
4	Regular Heavy User	4	6.1	1	1.4	5	3.7
	B1. Tobacco						
0	Non-smokers	53	80.3	54	77.1	107	78.7
1	Experimental	6	9.1	12	17.1	18	13.2
2	Current Regular Light	6	9.1	1	1.4	7	5.1
3	Current Regular Moderate	1	1.5	1	1.4	2	1.5
4	Current Regular Heavy	0	0.0	2	2.9	2	1.5
	B2. Tobacco Status						
0	Never Smoked Tobacco	39	59.1	36	51.4	75	55.1
1	Used to Smoke	14	21.2	18	25.7	32	23.5
2	Currently a Smoker	13	19.7	16	22.9	29	21.3
	C. Marijuana/Hashish						
	C1. Lifetime Usage						
0	0 Times	27	40.9	22	31.4	49	36.0
1	1-5 Times	11	16.7	11	15.7	22	16.2
2	6-9 Times	5	7.6	1	1.4	6	4.4
3	10-19 Times	6	9.1	6	8.6	12	8.8
4	20-39 Times	5	7.6	10	14.3	15	11.0
5	40 or More Times	12	18.2	20	28.6	32	23.5
	C2. Qualitative Scale						
1a	Rational Abstainer	4	6.1	2	2.9	6	4.4
1b	Risk-Avoidant Abstainer	26	39.4	22	31.4	48	35.3
2a	Experimental User (Light)	11	16.7	10	14.3	21	15.4
2b	Recreational User (Light)	17	25.8	19	27.1	36	26.4
3a	Regular Moderate User	6	9.1	5	7.1	11	8.1
3b	Heavy Regular User	2	3.0	12	17.1	14	10.3
	D. Alcohol						
1a	Rational Nonuser	2	3.2	0	0.0	2	1.5
1b	Non-user or Minimal User	19	30.2	22	31.0	41	30.6
2a	Family User (Light)	15	23.8	11	15.5	26	19.4
2b	Recreational User (Light)	17	27.0	26	36.6	43	32.1
3a	Regular User	5	7.9	3	4.2	8	6.0
3b	Heavy User	5	7.9	9	12.7	14	10.4
	E. LSD and Other Psychedelics						
0	Never Used	62	93.9	58	82.9	120	88.2
1	Experimented Minimally	1	1.5	7	10.0	8	5.9
2	Experimented More Frequently	2	3.0	2	2.9	4	2.9
3	User	1	1.5	2	2.9	3	2.2
4	Heavy User	0	0.0	1	1.4	1	0.7
	F. Amphetamines, or Barbiturates, or Cocaine						
0	Never Used	57	86.4	59	84.3	116	85.3
1	Experimenter	5	7.6	7	10.0	12	8.8
2	Occasional User	2	3.0	2	2.9	4	2.9
3	Heavy User	2	3.0	2	2.9	4	2.9

Frequency of Adolescent Substance Use (Continued)

		Girls N	Girls %	Boys N	Boys %	Girls + Boys N	Girls + Boys %
	G. PCP or Opiates						
0	Never Used	61	92.4	67	95.7	128	94.1
1	Experimenter	3	4.5	1	1.4	4	2.9
2	Occasional User	1	1.5	2	2.9	3	2.2
3	Heavy User	1	1.5	0	0.0	1	0.7
	H. Other Illicit Drug Use						
1a	Rational Abstainer	9	13.6	9	12.7	18	13.1
1b	Risk-Avoidant Abstainer	25	37.9	24	33.8	49	35.8
2a	Experimenter (Light)	8	12.1	4	5.6	12	8.8
2b	Recreational User (Light)	8	12.1	14	19.7	22	16.1
3a	Regular User	7	10.6	3	4.2	10	7.3
3b	Habituated, Addicted, or Abuser	9	13.6	17	23.9	26	19.0
	6 Point Initial Use Guttman Scale						
1	No Substance Use	3	4.5	2	2.9	5	3.7
2	Caffeine	9	13.6	7	10.0	16	11.8
3	Alcohol	13	19.7	9	12.9	22	16.2
4	Marijuana	12	18.2	15	21.4	27	19.9
5	Tobacco	20	30.3	23	32.9	43	31.6
6	Other Illicit Drugs	9	13.6	14	20.0	23	16.9
	4 Point Recreation Use Guttman Scale						
1	No Recreational Use	29	43.9	29	41.4	58	42.6
2	Alcohol	12	18.2	5	7.1	17	12.5
3	Marijuana	20	30.3	30	42.9	50	36.8
4	Illicit Drugs	5	7.6	6	8.6	11	8.1

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The Development of Children's Health Orientations and Behaviors: Lessons for Substance Use Prevention

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In the first public health revolution, the enemy was found in the environment, and was conquered by public programs: immunizations, improved sanitation, and clean food and water. In the second public health revolution, the enemy has been engaged, and may prove to be more difficult to conquer. The enemy is our own behaviors, nutritional habits, exercise habits, substance abuse, and lifestyles, which are the patterns of living begun in childhood that evolve to patterns of premature morbidity and mortality in adulthood. Recognition of the link between adult health problems and childhood and adolescent behaviors has given new emphasis and urgency to developing and implementing children's health promotion programs that affect children's everyday behaviors rather than relying on traditional health education programs that merely impart knowledge.

Investigations into the etiology and prevention of drug abuse require a conceptual framework which includes health-related behaviors and the development of the child's orientation toward health beliefs. The purpose of this chapter is to review the history of health promotion research involving children and the four most influential conceptual systems which have evolved: Cognitive Development Theory (CDT), Health Belief Model (HBM), Behavioral Intention Theory (BIT), and Social Learning Theory (SLT). The many variables used in these approaches are discussed in terms of developmental factors, environmental factors, and individual characteristics. They are placed within the context of research in this field, including our own work which attempts to synthesize or evaluate these models and variables with regard to the development of behaviors, beliefs, and attitudes concerning medicines and abusable substances in children and young adolescents. Implications are noted for etiologic research and prevention activities specific to substance abuse and to health promotion in general.

HISTORICAL PERSPECTIVE

In the mid-1970s, children's health education became the focus of a number of investigators from different disciplines who became convinced that intervention in childhood could prevent illnesses in adulthood. One goal was to find effective ways to change children's health behaviors. A second was to find measurable program outcome variables that had a high probability of being

related to health status indicators in later years. The researchers turned to general learning theories of children, and specifically, to theories of how children acquire health orientations and behaviors. They needed to learn about the stability of these orientations and behaviors, and how they relate to health orientations and behaviors in adolescents and adults. They needed to identify risk factors in children, whether individual or environmental. These new interests revived basic questions about the ways children acquire and maintain health orientations and behaviors, whether healthful or harmful.

At about the same time, the results of smoking prevention programs (Evans et al. 1978; McAlister et al. 1980; Botvin et al. 1980) indicated that social skills, e.g., skills in resisting peer influences to smoke, were more important than knowledge of the long-term effects of smoking. Questions were raised about the age at which children should be exposed to these programs, about whether these types of programs could affect other kinds of health behaviors, and whether comprehensive or specific programs were most effective. With a convergence of interests, behavioral scientists, health educators, epidemiologists, and the medical community came together in an exciting new era to address basic and pragmatic questions in children's health promotion.

The earlier (and sparse) work on the development of children's health beliefs and behaviors was based on Piaget's (Inhelder and Piaget 1958) Cognitive Development Theory and on Lewin's (Lewin et al. 1944) Field Theory. The impetus for the interest in CDT was a belief that interactions with healthy or ill children, whether by clinicians or educators, should be guided by children's understanding of concepts. Rosenstock (1966), expanding on the CDT approach and drawing on Lewin's theory, demonstrated the role of perceived vulnerability, health salience, and motivation which are components of the Health Belief Model. In 1970, Gochman, noting the almost total lack of information on children's health beliefs, began a series of investigations with these same variables. Bandura (1977), building on the earlier operant conditioning formulation of learning theories, emphasized self-evaluation processes in the initiation and maintenance of behaviors and, thereafter, his Social Learning Theory began to influence the development of children's health intervention programs. Another model, Behavioral Intention Theory, derived from expectancy-value and social norm theories by Fishbein and Ajzen (1975), emphasized an individual's subjective appraisal of others' behaviors or attitudes and the individual's motivation to comply, as well as the individual's evaluation of the consequences of his or her behavior. BIT has received limited application to the health behaviors of children.

In 1981, a conference was held at the University of Texas Medical Branch at Galveston to develop consensus on definitions, research methods, and variables that should guide future research on the health behavior of children and to identify gaps in knowledge (Bruhn and Parcel 1982a). Consensus was reached that four

perspectives--Cognitive Development Theory, Health Belief Model, Behavioral Intention Theory, and Social Learning Theory--formed the basis for the preponderance of knowledge about the health conceptual systems of preadolescent children. The implication was that these models should form the basis of contemporary intervention programs as well.

THE FOUR HEALTH CONCEPTUAL SYSTEMS

A brief review of the theoretical perspectives that form the four conceptual systems indicates the ways in which they relate to children's concepts of health and illness. The key variables (see table 1) relevant to the conceptual systems are presented in the following section and are grouped according to developmental, environmental, and individual factors. Most of the discussion is limited to preadolescent children.

Cognitive Development Theory

Piaget's approach to COT emphasizes stages of children's causal thinking from preoperational (about 3 to 6 years) through concrete operational (about 7 to 11 years) to formal operational (about 12+ years). According to CDT, the preoperational stage is characterized by magical thinking, circularity, emphasis on the self, and difficulty in dealing with more than two factors in causal relationships. In this stage, the child confuses physical and psychological causes of illness. In the next stage, concrete operational, children begin to think relationally, to generalize to others and from others, and to be capable of reversing causal explanations, but children at this stage may have problems integrating several variables in causal relationships. The formal operational stage is characterized by an ability to think hypothetically and abstractly. At this stage, the child is capable of differentiating between self and environment and of integrating multiple factors in understanding health and illness.

The CDT approach to learning suggests that stages of development, although influenced by personal experience, are not formed as the result of direct responses to parents, peers, or the child's own behavior, but result from the child's cognitive processes as they develop and operate within his or her environment. These processes reflect the child's independent formulation of attitudes, beliefs, and behavioral intentions. The behaviors and attitudes of parents and peers are important as they are transmitted through language, but they are mediated by the child's perceptions. Thus, the child's understanding of parents' and peers' behaviors and attitudes reflects individual interpretations or reconstructions of parents' and peers' actual attitudes and behaviors. The stages of development are hypothesized to be relatively stable across sex, socioeconomic, and cultural groups, although they may be influenced by these characteristics.

TABLE 1

Principal Variables Associated With Children's Conceptual Systems of Health and Illness.

	CONCEPTUAL SYSTEMS*				GU STUDY*
Variables	CDT	HBM	BIT	SLT	KIDMED
Developmental					
Age		X	X	X	X
Cognitive Stage	X				X
Environmental					
Family Behavior/Attitudes	X		X	X	X
Peer Behavior/Attitudes	X		X	X	X
School/Media Influence	X		X	X	X
Availability		X		X	X
Individual					
Cognitive/Affective					
Perceived Vulnerability		X	X		X
Health Salience/Values		X	X	X	X
Health Locus of Control		X		X	X
Self-Concept/Esteem/Efficacy	X			X	X
Risk-Taking		X		X	X
Competency					
Knowledge				X	X
Decision-Making Skills	X			X	
Coping Skills	X			X	
Behavioral Capability	X			X	
Personality	X				
Autonomy	X			X	X
Trauma				X	X
Health Status/Stress		X			X

* CDT = Cognitive Development Theory; HBM = Health Belief Model; BIT = Behavioral Intention Theory; SLT = Social Learning Theory; GU Study = Georgetown University Study: "Abusable Substances, Medicines and Children"

A major contribution of CDT is the understanding that adults cannot provide children information about health and illness based upon logical explanations of causality, and expect them to infer appropriate behavior. Moreover, an adult cannot predict what a child in a particular stage of cognitive development believes. Children, in trying to make sense of their worlds, apply their own systems of logic. Thus, a child may say that a doctor uses a stethoscope "to see if I have a heart." As Perrin and Gerrity (1981) observed, when the doctor tells a 7-year-old, "There's edema in your belly," the child finds it reasonable to assume that "the demon" was put there for punishment. As children told us, bad drugs come (quite logically) from drug stores. If a child has heard that bad drugs mess up the mind, who can fault the child for believing that the mind can be fixed by having a doctor open up the head to take the bad drugs out (Bush and Davidson 1982). What adult could have anticipated this belief?

While there is consensus that intervention programs should be directed to the child's developmental stage for concepts of health and illness, Gellert (1978) has argued that there is no evidence that doing so will reduce an ill child's stress regarding the cause of the illness, or otherwise change his or her condition. Similarly, there is no evidence that providing information at a child's level of understanding increases the probability that he or she will change his or her behavior (Kalnins and Love 1982). The provision of developmentally staged health information may be necessary but insufficient to secure the goals of health promotion programs.

Implications of CDT. As will be reiterated frequently throughout this chapter, both etiologic research and the design of prevention programs for young children must consider the developmental stages achieved by each target population if the research is to have any validity and if the intervention Is to be effective. For example, it is just as difficult, and unlikely, for a child to provide accurate information as to comprehend abstract information if the child is in a preoperational period of development characterized by magical thinking and concrete patterns of thought. The length of the preoperational period may vary with the accessibility or inherent abstraction of the subject matter and, although a high correlation exists between achievement of a developmental stage and its ascribed chronological age, some individuals at all ages evidence developmental lags which inhibit their development of representational thought. The implication is that some efforts be expended to assess cognitive and psychological developmental status of any target population, and these efforts should be reflected in the research results and in the design of curricula for prevention programs.

Health Belief Model

The original conception of the HBM (Rosenstock 1966) included the following major elements: the level of threat posed by the health problem as determined by the individual's perception of the

problem's severity and his or her susceptibility to it; the perception of benefit from engaging in a behavior to reduce the threat; the barriers (physiological, physical, economic, social) to performance of the behavior, and some type of cue or trigger to action. Becker et al. (1977) reformulated the paradigm to include health motivations to account for differences in concern about health matters and to include general health orientations such as health locus of control as well as demographic variables. Although the HBM has received considerable attention relative to children, particularly by Gochman (1970a, 1970b, 1971a, 1971b, 1972, 1977, 1982; Gochman and Saucier 1982), the rationale on which it rests may be inappropriate to explain children's healthful or harmful behaviors.

Implications of the HBM. For this model to apply to children, each child would have to value health and be able to make rational choices based on subjective estimates that his or her behavior will reduce threats to, or improve, health status. Children would have to have the autonomy to make decisions about health behavior, and to act independently or influence the behavior of others on their own behalf. Nevertheless, research into specific variables associated with the HBM has resulted in important information about children's cognitive dimensions and those psychosocial and demographic characteristics that modify these dimensions.

Behavioral Intention Theory

In Fishbein and Ajzen's (1975) conceptualization of BIT, behavioral intentions are the best predictors of behaviors. The two major predictors of a behavioral intention are attitudes and the subjective norm regarding the behavior. Attitudes are composed of the individual's beliefs about the behavior and his or her evaluation of the consequences of performing it. The subjective norm is derived from the individual's perceptions of others' beliefs about the behavior and his or her motivation to comply with these norms. Further, Fishbein and Ajzen suggest that the relationships among these variables are strongest when there is the greatest specificity among the content of the variables. For example, a child's perception of the norms about health maintenance or alcohol use would not predict cigarette use as well as the child's perception of the norm about smoking. BIT also implies that behavioral intentions to perform relatively public healthful or harmful behaviors, e.g., smoking, drinking, exercise, eating, may be influenced more by social norms than relatively private behaviors such as sleeping, dental care, and illicit drug use which may be more influenced by personal characteristics or the attitudes of significant others, family, or close peer groups.

Although BIT has received scant attention relative to children's health orientations and behaviors, it is an attractive model because it recognizes behavioral intention as an important variable that predicts behavior, because it includes both reference group norms and the child's motivation to comply with them, and because its emphasis on specific behaviors may prove

more useful with children, most of whom are not prepared cognitively to deal with abstractions and inferences. Like the HBM, however, it relies on children's abilities to anticipate the consequences of their behaviors and to recognize that different individuals and groups have different normative beliefs; however, these abilities depend on developmental processes not evident in young children.

Implications of BIT. This conceptual system is particularly dependent upon developmental age, experience of the child, and the area under consideration. Certain topics and experiences are beyond the child's ability to imagine or anticipate unless they have been experienced directly or taught specifically. For example, sexual processes rarely are accessible to a young child unless the child has experienced sexual abuse. BIT assumes that the child has enough information with which to develop behavioral intent and also assumes a certain fixity of intent. With reference to CDT, fixity of intent would be unlikely in a child 3 to 6 years of age in the preoperational stage. In the mid-years of childhood, the child would need to have had and to comprehend experiences concerning the topic in question and would be unable to generalize this information until approximately 12 years of age, when formal operational patterns of reasoningare used. Research with young children would need secondary sources of information or use of some technique such as play therapy; research with older children would have to avoid questions which feed information to the child and which lead him or her toward a particular response.

Social Learning Theory

Central to SLT is the notion that behaviors are gradually acquired and shaped as a result of the positive and negative consequences of those behaviors. To determine a child's probability of performing a behavior, it is necessary to identify the past frequency of the behavior and the long- and short-term rewards and punishments that accompany performance of the behavior. Parents, teachers, siblings, peers, and others provide the reinforcing or punishing consequences necessary to shape and maintain a behavior. These individuals also serve as vicarious models, providing examples of appropriate and inappropriate behaviors and their consequences. Eventually, as the child matures, rewards and punishments may be self-administered or internalized.

In SLT, the environment in which the behavior occurs is important as the source of cues, rewards, and punishments. This characteristic distinguishes SLT from other models which depend more on the child's construction or perception of his or her environment, i.e., its cognitive representation to the child. However, the most recent representations of SLT recognize that the child is capable of imagining or anticipating behaviors or even attitudes of significant others toward the behavior and of placing a value on the behavior or its consequences. This combination of expectation and expectancy held toward a particular health-related

behavior is similar to the HBM's concern for perceived benefits and health salience.

Parcel and Baranowski (1981) have discussed the nontraditional components of SLT as they are relevant to children's health education. The notion of behavioral capability recognizes that rewards will not suffice if a child is not ready to acquire a behavior. The SLT variable on expectations recognizes the anticipatory capabilities of children. Expectancies in SLT are the values placed by children on the behavior or the consequences of the behavior. Self-control in this model implies that, in addition to the reinforcers of others, the individual can gain control by monitoring his or her own behavior and controlling the reinforcers. Self-efficacy refers to an internal state of perceived competence to perform desired behaviors or to refuse to perform undesired behaviors; emotional coping responses are those which reduce anxiety associated with performance of desired behaviors and, therefore, facilitate their adoption. SLT also recognizes reciprocal determinism in contrast to traditional operant conditioning theory, which did not acknowledge that the child may transform his or her environment as well as be transformed by it.

Implications of SLT. This conceptual system assumes learning from almost an ecoloqical base and, therefore, includes most of the variables considered in the other three systems. Ironically, SLT does not consider the cognitive development stage. It is upon this model that many health promotion programs are based, perhaps because it can be addressed to large groups on the assumption that social forces can reinforce and change individual behavior. If appropriate role models, social climate, rewards, and skill in resisting negative influences can be provided, then SLT predicts that the child can acquire and maintain behaviors associated with promotion and enhancement of health, thus offering an apparently cost-effective mass approach. The limitations of SLT derive from the ability of the child to comprehend and respond favorably to the messages and influences, the credibility of the message, salience, and the ability of the child to integrate these external influences within a personal framework. Many of these points have been discussed by Baumrind (this volume). SLT also has limitations because of the magnitude of influences to which a child is subjected outside the confines of an SLT program. SLT assumes that the child will become a change agent within his or her own environment, which is not always possible. Research is needed on the impact of SLT on the child in terms of the child's interaction with and impact on his or her environment. Unless that environment is modified, the effects of an SLT intervention program are likely to be short term.

Before discussing the principal variables used in the above four conceptual systems, we wish to describe our ongoing research with regard to the development of behaviors, beliefs, and attitudes of children in the area of medicines and abusable substances. This

project, currently being conducted in Washington, D.C., is referred to as KIDMED.

KIDMED: A LONGITUDINAL STUDY

In our current work (Bush 1981; Bush and Davidson 1982; Bush et al. 1983a, 1983b, 1983c; Ahmed et al. 1984), we are studying the development of behaviors, beliefs, and attitudes with regard to medicines and abusable substances in children from 5 years of age through adolescence. This work is guided by the theoretical perspectives presented above and represents an attempt to identify the most salient elements of each approach for understanding the use and abuse of such substances. Toward this end, components of the systems are assessed using five sources of information: interviews of children, mothers, and teachers; review of school health records; and visits to neighborhood commercial establishments. The primary research instrument, a questionnaire administered individually and privately, was developed from an extensive set of questions piloted with 64 children in grades kindergarten to six (K to 6) in 1978-79. A variety of psychometric procedures was used to reduce the questionnaire to an instrument suitable for all grades and socioeconomic levels.

The initial sample for this study was 420 District of Columbia public school children stratified on sex, socioeconomic status (SES), and grade, i.e., 10 boys and 10 girls in each of grades K to 6 at schools representing three SES levels as indicated by census tract data. The first data collection was conducted in 1980-81. We are currently conducting a longitudinal study of a subsample of 300 of these children (who are now in grades 3 to 7) and their mothers with matched replacement to complete the appropriate cells. Because we are currently analyzing the data from the second wave of collection, the results reported here are restricted to the initial cross-sectional sample. Findings are presented in the context of research on the respective variables discussed below which derive from the four conceptual systems presented above.

VARIABLES USED IN THE FOUR CONCEPTUAL SYSTEMS AND KIDMED

To facilitate this presentation, variables which are central to one or more of the four conceptual systems are used as focal points for discussion. KIDMED, as noted on table 1, includes all these variables with the exception of Personality, Decision-Making and Coping Skills, and Behavioral Capability. KIDMED is an attempt to explore and evaluate the impact of this total range of variables on the child's attitudes, beliefs, and behaviors regarding medicines and abusable substances. The personality factors are subsumed under developmental and environmental concerns. The behavioral capability and the decision-making and coping skills of the child are integrated in areas concerned with such traits as autonomy, risk-taking, and locus of control which is more appropriate in view of the younger spectrum of our sample. To facilitate this presentation, variables which are central to

one or more theoretical frameworks are used as focal points for discussion.

Developmental Factors

Children's Age/Cognitive Developmental Stage. The evidence suggests that age and cognitive developmental stage are highly correlated, but cognitive developmental stages of children relative to concepts of health and illness are likely to lag compared to other conceptual areas. Bibace and Walsh (1979.1980) have offered a refined three-stage classification for children's responses to questions about health and illness: the first stage, the preoperational, includes phenomenism and contagion; the second stage, the concrete operational, includes contamination and internalization; and the third stage, the formal-operational, includes physiological and psychophysiological mechanisms. During their interviews of 72 children, Bibace and Walsh found that, in general, 4-year-olds offered explanations that emphasized contagion, "You catch it, that's all"; 7-year-olds emphasized contamination, "Colds come from cold air"; and 11-year-olds emphasized physiological mechanisms, "(A headache) is pressure inside your head, and it makes your head hurt."

Perrin and Gerrity (1981) also found significant differences among age groups, consistent with predictions based on cognitive development theories, when investigating the illness beliefs of 128 children. Only one-third of eighth graders were found to have reached the formal operational stage of development, suggesting that concepts of health, health promotion, and illness may be more difficult for children to grasp than other content areas taught by educators. The relative lack of sophistication of children in health and illness concepts should, therefore, be taken into account. Children become aware of the multiple interacting factors that cause disease only after they reach 10 years or more. Children may not be capable of logical deductive thought until adolescence, and most children younger than 8 or 9 years cannot respond to health education programs that rely on causal explanations, potential events, inferences, or even personal feeling states to motivate them. From about age 8 to adolescence, children begin to make sense of their worlds using their own systems of logic and reasoning processes that lead them into beliefs that cannot be predicted by adults.

The development of children's concepts of health has not been investigated as much as the development of children's concepts of disease. Natapoff (1978) and Neuhauser et al. (1978) suggest that children in all stages operationalize health as conformity with lifestyle rules, to eat properly, wear warm clothing, take vitamins, and get enough sleep.

Examples from our own research demonstrate some of these developmental stages. When we held a conversation with children in the concrete operational stage, after they had heard a talk from "Officer Friendly" and had seen a film about a boy who opens

a window to steal money from his mother's purse to buy drugs, one 7-year-old described the plot and said the whole sequence of events was "peer pressure." Another child said that "PCP makes you jump off the roof," and another said that the boy's mother wouldn't let him in the house because "she washed the floor and it wasn't dry yet." None inferred a message for their own future behaviors, which was surely the intent of the program, but instead accounted for what they saw and heard in terms of their own experiences to the extent possible, or simply gave it names they had heard. As another example, an 8-year-old girl told us she had quit smoking, a "habit" she had acquired from her father when she was 7. When asked why she quit, she said because her teacher had showed her a picture of two lungs, a nonsmoker's lung and a smoker's lung, and she didn't like the dirty one. Although this child could also tell you that smoking caused cancer, it is more likely that the motivation to quit arose from a self-concept that did not include being dirty, rather than from her perceived vulnerability to cancer.

Environmental Factors

Much attention has been given to environmental influences in research on substance use and abuse in adolescence. Although the models based on children's conceptual systems suggest the importance of families, peers, and others on the development of health orientations of both young children and adolescents, and their influence on healthful as well as harmful behaviors, these influences have rarely been measured at the environmental level in health promotion research. The focus has been primarily on the child.

Family Behavior and Attitudes. Although it is reasonable to expect the health attitudes and behaviors of children and their mothers to be related, there has been little support for these predictions in the literature. Mechanic (1964) was one of the first to collect data from both children and their mothers to investigate children's health attitudes and behaviors. Contrary to his hypotheses, there were only weak or nonsignificant correlations between children's and mothers' attitudes or responses to symptoms. Neither the child's age nor sex was a significant determinant of these relationships. A decade later, Campbell (1975a, 1975b) interviewed hospitalized children, ages 6 to 12 years, and their mothers about concepts and attributions of illness. He demonstrated that the illness concepts of the child were not likely to resemble those of the mother, but were likely to be related to a group profile of the concepts of the mothers of other children at the same age. Relative to the attribution of illness, although mothers and children similarly discriminated among a set of common symptoms when defining them as representing illness, mothers were more likely to define the presence of these symptoms as indicating illness when they occurred in the child than when they occurred in themselves. Similarly, the children were more likely to attribute illness to their mothers than to

themselves. Older children were more like their mothers when defining symptoms as illness.

In our own work, we failed to support hypotheses developed from Campbell's (1975b) explanation of his results. If mother and child are ego defensive, as Campbell suggests, children should expect their mothers to be more likely to take medicines for common illness than themselves, and children should perceive their mothers to be more vulnerable than themselves. In our study, children in all seven grades, both sexes, and all three SES levels, perceived themselves more vulnerable than their mothers for five common health problems. Further, girls and high SES children perceived themselves and their mothers to be more vulnerable than boys and low SES children perceived themselves and their mothers to be. However, expectations of taking medicines or something special for health problems were not related to vulnerability, but instead depended on the specific illness. Children perceived themselves as more likely than their mothers to take "something special" for colds, fevers, and upset stomachs, but less likely for nervousness and trouble sleeping. These results suggest that there is a subset of children who have a high expectation of medicine use as a response to health problems. Furthermore, all of these studies indicate that children's definitions of illness, while mediated by their personal experiences, are more the result of the general social accretion that keeps pace with their cognitive developmental stages than the result of direct interpersonal learning from parents. In our current study, we are interviewing both parent and child with regard to their attitudes and expectations for themselves and each other. These data should substantially increase our understanding of the relationships between the mother's and child's health attitudes and behaviors.

Although a direct relationship between parental beliefs and those of their children is not supported in the literature, parental behaviors may influence children, but these relationships appear to be age and behavior dependent. Pratt (1973) reported on the relationships between parental child-rearing styles and children's (9 to 13 years) health care practices, after interviewing parent-child pairs. She concluded that a traditional authoritarian method of child rearing, which emphasized conformity and obedience, was less effective in inducing healthful practices in children than developmental methods that encouraged responsibility and independence, and used reasons and information as well as rewards to encourage healthful behaviors. Although there were direct correlations between mothers' and children's health behaviors, the relationships between child-rearing style and children's health behaviors persisted after controlling for the level of mothers' health behaviors. Pratt's results suggested that mothers' health behaviors have both a direct and an indirect effect on children's health behaviors, which are mediated by parental child-rearing style, and are independent of SES. Even though the mother may set a poor example by her own health habits, if her child-rearing style is supportive, health promotion

programs outside of the home may facilitate the child's developing his or her own pattern of healthful behaviors.

In an evaluation of an SLT-based Preschool Health Education Program (PHEP) for children ages 2 to 4 years and their mothers, Bruhn and Parcel (1982b) found no baseline bivariate relationships between children's health and safety behaviors and their mothers' health behaviors, health locuses of control, mothers' health values, or background variables (sources of health information, use of health services, health status, and teaching children health and safety behaviors.) After children had participated in the PHEP, a cluster analysis confirmed that the mothers' health behaviors were not generally associated with their children's safety or health practices (Parcel et al. 1983). Only the children's intentions to smoke, to use seat belts, and to eat fruit instead of candy clustered with mothers' behaviors. These and other findings (Dielman et al. 1980) lead to the conclusion that, for most health areas, neither parental modeling nor parental health beliefs have much impact on children's health orientations and behaviors when the children are very young. But with increasing age, parental behaviors, not beliefs, have increasing influence on their children's health behaviors.

The strongest support for the modeling effect of families on their children's behaviors derives from the relationship between parental smoking and children's intentions to smoke, experiment with smoking, and, as children move into adolescence, frequency of smoking. Shute et al. (1981) reported that half of a sample of preschool and first grade children who were exposed to smoking in their homes said they intended to smoke in the future, compared to 11 percent who were not exposed. In our sample of urban children in grades K to 6, having a parent who smoked doubled the probability that a child said he or she intended to smoke in the future (Ahmed et al. 1984). In a British study of smoking by schoolchildren ages 10 to 11 years (Bewley et al. 1974), about half of smokers had two smoking parents compared with about a quarter of nonsmokers, and no child who smoked heavily came from a nonsmoking household. Schwartz and Dubitsky (1967) argued that parents who modeled nonsmoking behavior were more effective than smoking parents who disapproved of smoking by children. In effect, as children move into their teens, the family association with smoking is sustained, although peers play an increasing role. Nolte et al. (1983) found that a smoking parent doubled the probability of a child smoking, but that if the parent's attitude was also conducive, the probability quadrupled. Mechanic (1980), after reinterviewing most of his sample of children 16 years later at 25 to 29 years of age, has reported that smoking behavior was not associated with either reports of parental smoking or reports of parental admonitions not to smoke, but that educational level attained and parental interest in the child were related to such behaviors. Thus, the limited information on the relationships between children's smoking behaviors and parental influence suggests that the modeling effect is strongest in preschool and early school years, that it weakens somewhat as children move

through elementary school grades and are affected by wider societal attitudes, that family smoking behavior and attitudes and particularly smoking by older siblings is associated with adolescent smoking, but that in adulthood, other factors may become more important in predicting smoking than parental smoking.

We have found similar results for other abusable substances, i.e., alcohol and marijuana (Ahmed et al. 1984). The number of family members using an abusable substance was a strong influence on the probability of a child's saying he or she had used or expected to use specific substances, although the strength of influence varied among the drug categories. For instance, having one family member smoke cigarettes nearly doubled a child's probability of saying he or she had used or expected to use cigarettes, but having more than one family member smoke did not further increase the probability. For alcohol, the probability increased as the number of family member users increased, although not as dramatically as for marijuana, where the relationship was the strongest between a child's potential use scores and number of household users. Only 4% of children in households with no users used or expected to use marijuana themselves, while one user in the family increased the rate of "yes" responses to 23% and two or more users to 39%. These results and the findings regarding health beliefs lead to the conclusion that the development of health beliefs coincident with cognitive development may best be explained with CDT, but that in middle childhood, consistent with SLT, the practice of specific behaviors or use of abusable substances may be learned through some modeling of parental behaviors. Thus, changing parental beliefs may have little influence on children's beliefs or behaviors. However, changing parental behaviors may influence the early development of health behaviors and prevent early onset of substance use.

Peer Behavior and School/Media Influence. Substantial evidence indicates that peers influence substance use (Kandel 1978; Evans et al. 1978; McAlister et al. 1980; Hurd et al. 1980; Glynn 1981; Brook et al. 1983). As children move into adolescence, the influence of families on children's smoking behaviors decreases relative to the influence of peers, but may mediate peer influence (Chassin et al. 1981; Krohn et al. 1983). Also, children's perceptions of peers' substance use may be more strongly associated with children's intentions to use a substance than the peers' actual use (Jessor and Jessor 1977). Dielman et al. (1982) found that the child's estimate of the number of his or her peers who smoke was a better predictor of smoking by children age 6 to 16 years than parental smoking. In our study (Ahmed et al. 1984), perceptions of peers' use was a significant predictor of elementary school children's intentions to smoke cigarettes and marijuana, and to drink alcohol, but not as strong predictors as salience variables composed of parental use and the child's involvement in use, for example, lighting cigarettes. Also, as has been observed in older children, our elementary school age children perceived their peers as more likely to smoke than themselves when they were older. The effect of this "inflation"

of the subjective norm for smoking and the influence of peers and other environmental influences on other health-related behaviors is largely unknown. BIT would predict that children's own expectations would be influenced by these normative beliefs.

Lewis and Lewis (1974) investigated the impact of television commercials on children's health-related beliefs and behaviors, and found that a majority of fifth and sixth graders believed them. The commercials involved over-the-counter medicines, food, and hygiene products. The credibility of the commercials was greatest when a parent had used the advertised product and least when neither a parent nor the child had used it.

Relative to children's eating habits, Jeffrey et al. (1982) found that children watch television programs and commercials at a very high rate. Moreover, although g-year-old children were both more aware of the intentions of advertising and more distrustful of it than 4-year-old children, the higher level of cognitive development did not help the older children resist the influence of the television messages any better than the younger children. Drawing on an SLT framework, the investigators suggest that the modeling effects of television advertising extend across cognitive development levels. They recommend that pro-nutrition messages should employ multiple models, including peer groups, to enhance vicarious learning experiences.

Our own work and that of Kowitz and Clark (1974) indicate that, when asked about their sources of information on abusable substances, younger children are likely to cite parents, television, and school in that order, while older children are less likely to list authoritarian sources but favor friends and other students as primary sources. With regard to medicines, children, irrespective of age, were most likely to report the media as their primary source of information, followed by family and health professionals.

Availability. Not only do parents model smoking and drinking behavior. but cigarettes and alcohol -are available in the home. In another area,-children's autonomy relative to buying medicines is facilitated by the existence of neighborhood convenience stores (Bush and Davidson 1982). Also, children cannot eat healthful snacks if they are not available in the children's homes or schools, or easy to buy. Availability of a product is thus a major variable associated with modeling, a child's autonomy, and health-related behaviors.

Individual Characteristics

Variables which must be considered in terms of the individual child include demographic characteristics such as SES, ethnicity, and birth order (which are important in all of the conceptual systems, but not included in table 1) and developmental status, as already discussed. Also considered in terms of the individual child are a range of other factors dependent upon how the

individual child interprets events cognitively and affectively; competency, viewed as a state of readiness in the child; personality, autonomy, and traumatic experiences of the child; and individual health status and stress. Each of these areas is discussed in turn. With regard to cognitive and affective factors and competency, these interrelate with developmental status of the child because developmental status influences how the child may interpret an event, and competency increases with the developmental stage of the child. Cognitive and affective factors include five central types of variables: perceived vulnerability; health salience and values (expectancies); health locus of control; self-concept, self-esteem and self-efficacy; and risk-taking. Competency includes knowledge, decision-making skills, coping skills, and behavioral capability.

Percieved Vulnerability. Dielman et al. (1980) found partial support for a model of children's health beliefs which includes perceived general susceptibility, perceived susceptibility to specific conditions, and perceived seriousness of and susceptibility to disease. No sex differences were found, but younger children scored higher on perceived general susceptibility. Also, the youngest children showed the greatest variability, with children's health beliefs fairly firm by the time they reach the third and fourth grades.

Children's perceived vulnerability, the extent to which they feel susceptible to illness or expect to have health problems or accidents, has been the subject of research by Gochman (1970a, 1970b, 1971a, 1971b, 1972, 1977, 1982; Gochman and Saucier 1982) who has performed cross-sectional and longitudinal studies of children age 7 to 17 years. His research has shown vulnerability to be internally consistent and a stable construct by the time children reach school age. However, perceived vulnerability is not related to or predictive of the preventive health behaviors of children. Furthermore, alteration of children's perceptions of vulnerability or severity does not change their health behaviors (Lewis and Lewis 1977). Perceived vulnerability is perhaps best conceived as an anxiety-like state that, at least in children, does not motivate them to action, or expectation of action but may have the contrary effect.

The anticipatory abilities of young children are weaker than those of older children. Young children do not have as great an ability to perceive relationships between events and their consequences (Gochman 1971a) and thus have less ability to imagine actions that can affect the events. Young children are more likely to base their feelings of susceptibility on their current health states (Altman 1982).

In our KIDMED study (Bush 1981), we did not find that higher levels of perceived vulnerability to a health problem in elementary school children led to a higher expectation of taking action against the problem, but that the expectation of taking action was more dependent on the specific health problem. For

example, a high expectation of having trouble sleeping did not necessarily lead to a high expectation of taking something special for it, while a low expectation of having a fever could be associated with a high expectation of treatment. The results suggested that children learned to expect treatment from experience rather than from perceived vulnerability, and that an overall sense of vulnerability in children is, at best, very weakly associated with expectations of treatment.

Health Salience/Values (Expectancies). Failure to find associations between children's health beliefs and behaviors has been ascribed to the fact that health is not valued by children. Gochman (1970b, 1971b, 1972) has documented the relative unimportance or lack of salience of health concerns to children. Radius et al. (1980), using data from the same study as Dielman et al. (1980, 1982), noted that about half of the children were not concerned about health matters. Altman (1982) also found health not to be very important to children, but to be related to age, with younger children reporting greater concerns.

Recently, Vogt et al. (1983) challenged the idea that health is not salient to children. Based on interviews of children in grades 1 to 3, the researchers concluded that children's descriptions and self-reported behaviors to maintain health reflect a wellness concept rather than an illness concept, and that health education programs should build upon and reinforce children's high value for wellness and their abilities to select behaviors that maintain health. Natapoff (1978) supports the notion that an appeal to maintain health or wellness may motivate children to perform healthful behaviors, because she found that threats of illness or perceived vulnerability are not sufficient to motivate children. Indeed, the research over the last 20 years suggests that health and illness are not perceived as a continuum by children. Results indicate that children's understanding of health and illness is different from that of adults.

In our KIDMED study, we use salience as a behavioral variable that reflects a child's involvement in the process of use, an approach suggesting that the greater the child's involvement the more salient is the substance, regardless of his or her value system. We have found that the child's role in relation to household member's drug-using practices (e.g., serving alcohol to others or buying cigarettes for others) is positively associated with the child's own use or expectations to use the substance. These findings suggest the particular vulnerability of children who are participants in the process of household substance use.

Health Locus of Control. This measure of cognitive style, i.e., whether a child feels he or she has control over events or whether control is vested in external forces, has been shown to have considerable relevance for children's health orientations and behaviors. Gochman (1971a) found a negative relationship between perceived vulnerability and awareness of health behaviors among children who had internal locuses of control. Conversely, this

would mean that children who have external locuses of control feel vulnerable if they do not know how to keep from getting ill.

A Children's Health Locus of Control (CHLC) scale was developed by Parcel and Meyer (1978). We adapted and evaluated a shorter version of it (Bush et al. 1983c). Analysis of the CHLC scale scores indicated that higher SES and older children feel more in control of their health status, but children's scores tend to stabilize about age 11.

Parcel et al. (1983) did not find the CHLC scale to be associated with preschool age children's safety or health behaviors; but in our sample,we found CHLC to be an important predictor of children's expectations of receiving treatment for health problems. Children who knew most about medicines, and whose scores on the CHLC scale indicated feelings of greater control over health status, were least likely to say they,expected to take "something special" for common health problems. We did not find CHLC to be a significant predictor of children's reports of use or intentions to use cigarettes, alcohol, or marijuana.

Self-Concept, Self-Esteem, and Self-Efficacy. Lewis and Lewis (1983) listed self-concept and self-reliance (a measure of self-efficacy) among five variables measured at the level of the child which, based on anecdotes and descriptive information during the past nine years, are the most important determinants of children's health orientations and behaviors. However, they state that these concepts have never been measured as part of a longitudinal or a child-family investigation.

Of variables which relate to self-concept, self-esteem has received the most attention in children's health promotion programs. In adolescents, low self-esteem has been related to subsequent substance use (Kaplan 1975), but other studies have not found self-esteem to be an important correlate of substance use (Jessor and Jessor 1977; Kandel 1978).

Despite the lack of research on self-concept, self-esteem, and self-efficacy, these constructs are imbedded in contemporary school-based health promotion programs (see Hawkins et al. and Murray and Perry, this volume). Reports of the relationships of the variables to the effectiveness of these programs will be forthcoming in the next few years.

Risk-Taking. Slovic (1966) played a decision-making game with children age 6 to 16 and determined that the sex difference in risk-taking emerged between ages 9 to 11. Campbell and Carney (1978) confirmed that boys expressed more willingness to take risks relative to their own health and safety behaviors than girls. These authors found that risk-taking was associated with SES as well as age, with higher SES and older children expressing more willingness to take life-endangering chances. As Baumrind notes in this volume, risk-taking has both human developmental and cultural aspects.

In our urban sample of children in grades K to 6, willingness to take risks which might result in injury and illness was positively associated with use of and intentions to use abusable substances (Ahmed et al. 1984). The scales, risking injury and risking illness, were associated with use of and intentions to use alcohol and cigarettes in logistic regression analyses, while risking illness predicted use of and intentions to use marijuana. In the prediction of cigarette smoking or intentions to smoke, the order of variables, based on percent of the variance accounted for, was risking injury, salience (child's involvement in the process of use by household members), and risking illness. In the prediction of alcohol use and intentions to use alcohol, the two risk indices were significant, but were not as important as salience and the child's perception of peers' alcohol use. For marijuana, the important predictors were use by family members, perception of peers' marijuana use, autonomy, and risking illness respectively.

Clarke and Parcel (1975) discussed the concept of calculated risk, i.e., intentional acceptance of risk to achieve a particular goal. They argued that recognition of calculated risk acknowledges that there are social and mental benefits as well as physical risks to some behaviors, and that benefits and risks are separate dimensions rather than opposite ends of the same continuum. If these concepts can be presented so that they are easily understood by children in the concrete operational stage, this recognition may provide a more relevant perspective for teaching safety behaviors to children than ones that simply emphasize the negative consequences. As we have noted above, however, children tend to view health concepts in unidimensional rather than multidimensional terms.

Knowledge. The acquisition of knowledge is attendant to the purposeful performance of new behaviors. The fact that knowledge may be necessary but not sufficient to induce healthful behaviors is too well known to discuss here. Of perhaps more current interest is that health promotion programs for children should be responsive to what children already know or believe. For example, in our KIDMED study, we have attempted to investigate what children know about medicines and abusable substances, in the belief that this information could assist the design of health education programs. For medicines, we developed a medicine knowledge scale, and found it to be negatively related to children's expectations to take medicines for common health problems (Bush et al. 1983a). We also have acquired information on which medicines children expect to take for common health problems (Bush et al. 1983b). In the area of abusable substances, the degree of information these K to 6 children have about marijuana is suggested by the following: 25% of kindergartners, 45% of first graders, and nearly all fourth to sixth graders knew what marijuana was and could answer questions about it. About 50% of the children rated marijuana as a "worse" drug than cigarettes and cigarettes as "worse" than alcohol. Only about 3% of the children said that both alcohol and cigarettes are "worse than marijuana." While only 2% of the children said they expect to use

marijuana when they grow up, more than 18% said they expect a majority of their classmates to use it.

As mentioned earlier, SLT recognizes that rewards alone do not suffice if children do not have the skills or capability to acquire a behavior. The same can be said for knowledge alone.

Decision-Making Skills/Coping Skills. According to Lewis and Lewis (1983. p. 259). "children are far more competent in a variety of dimensions, including decision-making, than adults perceive (or want) them to be." Decision-making and coping skills, e.g., resistance to peer pressures, are included in most children's contemporary health promotion programs, particularly those intended to prevent substance abuse. Examples are the Life Skills Training developed by Botvin et al. (1980) and the "Know Your Body" program of the American Health Foundation (Williams et al. 1980). These programs have been successful in promoting children's healthful behaviors and in preventing harmful ones, but it has not been determined if decision-making and coping skills are the essential components of these programs. In addition, there is little in the literature to substantiate that children who are the most successful in acquiring decision-making skills are the most successful in performing healthful behaviors, or that children who do not acquire decision-making skills not only fail to perform healthful behaviors, but engage in harmful ones.

Behavioral Capability. Sometimes referred to as behavioral repertoire, behavioral capability recognizes that a school-age child has a set of health-related behaviors he or she performs, some of which may be maladaptive. Although behavioral capability is critical to a child's performance, except for intelligence and motor function, it is seldom evaluated in terms of the states of readiness to perform a health-related behavior that it represents in SLT. Its existence is recognized most often to account for the failure of a child to acquire a behavior or learn a skill.

Personality

Kellam et al. (1980), Block et al. (1984), and Baumrind (this volume) have examined personality antecedents of teenage drug use. The Kellam prospective study, conducted in a poor, black Chicago neighborhood, showed that aggressiveness, intelligence, and readiness for school were positively correlated with use of drugs, alcohol, and cigarettes 10 years later. The relationships between personality characteristics and drug use were stronger for boys than for girls, with aggressive and shy-aggressive boys most likely to use drugs as teenagers. Aggressiveness in early school years was also noted by Block et al. to be predictive of illegal substance use in 14-year-olds. Like Kellam et al., Block et al. found stronger predictive relationships for boys than for girls. Young children who were identified as rebellious and lacking in social skills, whose homes were disorganized and unconventional, and whose family interactions were discordant, were associated with heavier drug use in their teens. These results, which are

consistent with SLT, underscore the importance of the relationship of the child's personality with his or her environment, and suggest that psychosocial factors, which can be identified in the early school years, predispose to problem drug use. Thus, for high-risk children, support might start in early school years.

Autonomy

For the most part, children have been viewed as recipients of health care, with decisions made by adults on their behalf. Information on children's health habits is often obtained from their parents. Parents are asked about their children's eating habits, and investigations into children's compliance with medicine use have interviewed mothers rather than children. Lewis and Lewis (1983), Davidson and Kandel (1981), and Bush et al. (1983b) have challenged the notion of children's passivity in a variety of health-related behaviors, while Pratt (1973) has observed that children who are granted autonomy by their parents have better health-promoting practices than children of parents who maintain control. However, Mechanic (1980) questioned whether parental granting of autonomy to children was as important as parental interest for the subsequent performance of health behaviors when the children reached adulthood.

Lewis and Lewis (1977; Lewis 1974) evaluated a school based program in which children made their own decisions to visit a school nurse. They found that 8 to 12% of the children made half of the visits, although they had no serious medical problems. High users were most likely to be female, to be a first born or only child, and to be taken to physicians most often. In a replication study, the investigators noted that, while child-initiated care was successful for the majority of children, a subgroup became more dependent on the health care system rather than less. These dependent users were believed to have difficulty making a variety of appropriate decisions. Lewis and Lewis have designed a new curriculum to teach children decision making and self-reliance, which has been defined as seeking help when appropriate.

Davidson and Kandel (1981) observed that children have a high degree of autonomy in food choices and that a great deal of food is eaten away from home out of the sight of parents. Relative to medicines, the children in our KIDMED study perceived themselves to have some measure of autonomy. In our view, autonomy relative to medicine use is a continuum varying from a child's perception of physical access (even though forbidden) to independently deciding to take a medicine. Of the 420 children in our study, 80% said they had access to medicines in their homes, 70% said they took medicine by themselves, 52% said they had asked someone to give them a medicine, 40% said they got medicine from somewhere in the house by themselves, 12% had purchased over-the-counter medicines, and 9% said they had picked up a prescription by themselves. The statements relative to buying medicines were confirmed by a survey of commercial establishments. Also,

children's perceptions of autonomy in medicine use were positively related to their expectations to take medicines for common health problems, a relationship that probabality was derived from their experience with medicines. In our current longitudinal study with this population, mothers have been asked about their children's autonomy relative to medicine use and the mothers' and children's responses are being compared.

Actual or perceived autonomy is likely to be an age dependent continuum against which a variety of health-related behaviors can be assessed. For example, we found our medicine use autonomy scale to be positively correlated with children's use of and expectations to use marijuana in a regression model, but not predictive of cigarette or marijuana "use" (Ahmed et al. 1984). Children's positions on such a scale relative to other children their age might prove predictive of subsequent performance of other healthful or harmful behaviors.

Trauma

Experience of trauma has been hypothesized to relate to children's health orientations. Gochman (1977) hypothesized that, if perceived vulnerability is related to painful events, it should be related to traumatic experiences. He found, however, that perceived vulnerability to dental problems was more closely related to self-concept than to traumatic experiences.

In our study, medicine taste trauma (experiencing bad tasting medicines) was positively related to children's expectations to take medicines for common health problems. This relationship simply may derive from experience, with children who have had the most medicines in the past both having had the most bad tasting medicines and most expecting to take medicines in the future. Medicine taste trauma, but not perceived vulnerability to illness, predicted children's expectations to take medicines in a regression model.

Health Status/Stress

Ill and healthy children may have different perceptions of parents' attitudes and of illness itself. Brodie (1974) interviewed elementary school age children and concluded that healthy, nonanxious children do not perceive illness as punishment for their misbehavior. However, the feelings that illness is a form of punishment inflicted on the child for some reason that can only be imagined by the child is frequently found in children havin experienced illness or injury (Schore 1971). In Brodie's (1974) study, children who scored high on an anxiety scale were the most likely to see illness as a possible punishment or disruption in their lives, a relationship that did not weaken with age. Thus, beliefs about illness may reflect experience, personality variables (e.g., anxiety), and cognitive and developmental status (e.g., whether the child can differentiate physical and psychological causes for ill health).

Lewis and Lewis (1983) found that the health status of children who had high rates of self-initiated visits to a school nurse was not related to the visit rates, but was more likely to be related to inappropriate attribution of illness and poor decision-making skills. Recently, Lewis et al. (1984) developed a scale to measure distress in fifth and sixth grade children. Of 22 items in the scale, feeling sick was reported most frequently, but it ranked fifth in its ability to cause distress. Children's perceptions of "feeling sick" as a source of distress might prove useful for identifying children who have inappropriate concerns about illness, make poor health-related decisions, or have emotional problems such as depression.

IMPLICATIONS

Neither an interest in answering basic research questions nor a need to find ways to promote healthful lifestyles has stimulated much research into the development of children's health orientations and behaviors. However, when needs for health promotion are perceived as great, health educators and others do not wait for researchers to bring them answers. Programs are developed and programs are implemented. Fortunately, some programs are evaluated. The results from program evaluations are likely to be important sources of information on the development of children's health orientations and behaviors during the remainder of the decade. What must be kept in mind are the differences in perspectives between basic research and applied educational research. Basic researchers want to know how things came to be the way they are, while health education researchers want to know how to change things. Ideally, one would move from basic to applied research, but with so little direction available from basic research, we should try to learn how things came to be the way they are from applied research as well.

Currently, most school-based children's health promotion programs are based on a composite of variables drawn from the four conceptual systems of children discussed here, but with SLT receiving the most attention. Because program developers and evaluators have not known which variables were most important, only that some variables were not very important, their fear of ignoring an important group of factors has caused them to design health promotion programs using a pool of factors. As the very brief review of variables in the most prominent conceptual systems relative to children's health orientations and behaviors has suggested, no model offers an investigator or program developer much comfort, but certainly there are guidelines.

Research on the classic Health Belief Model variables suggests that perceived vulnerability to a health problem, expectation that the problem might occur, and perceived benefits of taking action for it are only weakly related to health behaviors in children. Perceived vulnerability in children may be best conceptualized as an anxiety state that can occur with feelings of lack of control.

Most elementary school age children simply have not developed the cognitive or anticipatory skills on which the HBM rests.

Although children may value health, they probably do not see it at the opposite end from sickness, i.e., opposite from a threatening state they can avoid by certain actions. Perceived benefits and expectations, along with the health orientation variables that are the most recent HBM additions, might be usefully associated with children's health behaviors or behavioral intentions, if benefits are not cast in terms of illness avoidance or feeling states, but are stated in terms of other values held by children, such as well-being and performing rewarding and healthful activities.

Very little information exists on the value of Behavioral Intention Theory, which predicts behavioral intentions from children's perceptions of social norms and attitudes. The significance of children's behavioral intentions for predicting their future behavior is uncertain. Perceptions of parents' attitudes toward smoking may be related to children's smoking intentions and behavior, but little is known about the effect of perceived social norms on other types of health related behaviors in young children. Fishbein and Ajzen (1975) argued that BIT models specific to particular behaviors explain more than general models, suggesting that BIT should be evaluated for a series of specific health behaviors. The question should be asked whether knowing children's perceptions of others' attitudes and behaviors is more important than knowing the actual attitudes and behaviors of others in health-related areas other than substance use. Although we found that children's expectations of treatment for common health problems was related to perceptions of their mothers' treatment of the same problems, we cannot say that these perceptions are more important than the mothers' actual behaviors. A fruitful line of inquiry might be to determine if children's misperceptions of other's attitudes and behaviors lead to poor health behavior choices, as mentioned by Johnston (this volume). As discussed earlier, BIT has limited utility with very young children who lack the experience and information necessary to form an intent. Fixity of intent is also unlikely in very young children.

Actual attitudes and behaviors of others who play significant roles with children are important in Social Learning Theory and Cognitive Development Theory. Correlations are generally weak between the health related attitudes or beliefs of mothers and those of their children. Acquisition appears to follow a developmental pattern with becoming children increasingly socialized to the wider attitudes and values in their environments. A strong modeling effect for smoking in preschool years remains strong into adolescence, although weakening somewhat as children acquire general social attitudes toward smoking. Little is known about the effects of modeling, particularly of siblings and peers, on other health-related behaviors of elementary school age children; however, it seems likely that

these modeling effects would prove stronger for relatively publicly performed behaviors than those performed privately.

Of the cognitive style variables, health locus of control and risk-taking both have shown relationships with children's health-related behavioral intentions and behaviors. How are these formed? Are they stable over time? Can they be influenced? How do they relate to other variables, especially self-concept, self-esteem, and self-efficacy? These "self" variables, along with decision-making and coping skills, are essential components of many so-called "state-of-the art" health promotion programs. "I Know, I Like, I Care For My Body," the slogan of the "Know Your Body" program--a comprehensive school-based health promotion program--exemplifies this approach. Although preliminary results from some of these programs are encouraging, little is known about the value or interrelationships of these variables. Certainly there is no longitudinal information. Although the evaluations of these programs offer the opportunity to learn more about these specific variables, the longitudinal evaluations will be biased by the treatments. However, information can be acquired from baseline data, and perhaps also from comparing data obtained from the control groups of various studies over time. In our own study, we are investigating the origins, stability, and interrelationships of some of these variables.

Another problem is that important variables may not have been included in either basic research or health promotion programs. Altruism is an example of a variable that might motivate children, but it is ignored in the egocentric health promotion programs in current vogue. Also, the early role of a wide range of personality traits may prove to be important for the subsequent performance of health and safety behaviors other than substance use.

The different conceptual systems discussed in this paper appear to be appropriate for different stages of development, and may also be appropriate for different health-related behaviors, for example, for health-enhancing compared to health-risking behaviors.

More intervention research is needed into preadolescent children's health promotion. Successful inducement of healthful lifestyles in elementary school age children may reduce the needs for substance use prevention and treatment programs in later years, if the healthful lifestyles can be maintained into adolescence. Currently, little is known about motivations in the elementary school age group, or how health-promoting and health-risking behaviors function in children's lifestyles, or how health-related orientations and behaviors are interrelated. The nexus between children's environments, and the degree of autonomy and reciprocal determinism that exists, should be explored for both positive and negative health behaviors.

Whatever conceptual schemes are selected to guide children's health promotion programs, Cognitive Develoment Theory should be considered prior to design, implementation, evaluation, and interpretation of effects. Knowledge of CDT suggests that health education programs which are produced by adults who are unaware of children's developmental stages, and administered to large groups of children at various stages, may be, while not necessarily counterproductive, a waste of resources.

FOOTNOTE

1 Unless otherwise indicated, health orientations means the whole set of personal beliefs. attitudes. perceptions. expectations. values, motivations, and psychological 'constructs that relate to health and illness.

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Childhood Predictors and the Prevention of Adolescent Substance Abuse

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This paper describes current approaches to drug abuse prevention with preadolescent children,links these prevention efforts to existing knowledge concerning the etiology of drug abuse among children and adolescents, identifies gaps in the prevention intervention research to date, and suggests etiological research which would aid in the development and refinement of preventive interventions focused on preadolescents.

The paper is based on the assumption that to be effective, prevention efforts must address the etiological risk factors for behavior. Given this assumption, it is important to distinguish between the behaviors of drug initiation, occasional use of drugs, regular or frequent use of drugs,and drug abuse as possible foci of prevention efforts. Each of these different behaviors may be predicted by somewhat different etiological pathways.

If this is the case, different prevention strategies may be implied depending on the outcome goal sought. It is important to clarify possible goals of drug abuse prevention before discussing the etiology of the different behaviors which might be targeted in prevention efforts.

DEFINING THE OUTCOME GOAL FOR PREVENTION

In drug focused prevention, there are at least five broad conceptions of the problem to be prevented. First, there is the view that what should be prevented is drug abuse. Drug abuse has been defined as a pattern of pathological use that persists for at least a month and that causes impairment in social or occupational functioning in the family, at school or in a work setting (American Psychiatric Association 1980).

The second type of behavior that might be prevented is the regular use of psychoactive substances,regardless of whether this use is accompanied by overt problems in personal, social, educational, or economic functioning. Prevention professionals may seek to prevent the regular use of tobacco, for example, because regular

tobacco use has been linked with negative health consequences. From this perspective, patterns of use need not be associated with dysfunctional performance. This position asserts that the regular use of substances should be prevented if such use has been identified with negative health consequences.

The third type of behavior that might be prevented is any use of psychoactive substances, regardless of whether this use is regular or accompanied by problems. This view receives mixed support. On the one hand, it is argued that any drug use in adolescence is undesirable given the developmental challenges of this period. From this perspective, drug use by teenagers is risky business and should be prevented (Durell and Bukoski 1982; McAlister et al. 1980). Abstinence is the desired outcome. On the other hand, it also is argued that some drug experimentation is to be expected during adolescence when individual separation and identity formation are major tasks. This perspective implies that some risk - taking "experimentation" with drug use is typical or normative in a statistical sense (Baumrind, this volume; Robins and Przybeck, this volume; Kandel 1982; Penning and Barnes 1982; Jalali et al. 1981). This latter perspective implies that a goal of prevention efforts should be to prevent experimentation from becoming abuse (Gersick et al. 1981). This raises the ticklish question of whether there is some middle ground between experimentation with drugs and drug abuse. While some argue that adolescents can use drugs such as marijuana responsibly (Smith 1984). few appear to take the position that "responsible use" should be encouraged among adolescents. The point is that some practitioners assert that any druq use by adolescents should be prevented, while others argue that the goal should be the prevention of regular use or abuse. The focus for the former group will be referred to in this paper as experimental drug use.

A fourth possible goal of prevention is to delay the age at which individuals first use psychoactive substances. While this may appear to be a modest goal, it has both empirical and practical significance. Etiological studies have shown that early onset of drug use predicts subsequent misuse of drugs. Rachal et al. (1982) report that "misusers" of alcohol appear to begin drinking at an earlier age than do "users." The earlier the onset of any drug use, the greater the involvement in other drug use (Kandel 1982) and the greater the frequency of use (Fleming et al. 1982). Further, earlier initiation into drug use increases the probability of extensive and persistent involvement in the use of more dangerous drugs (Kandel 1982), and the probability of involvement in deviant activities such as crime and selling drugs (Brunswick and Boyle 1979; Kleinman 1978; O'Donnell and Clayton 1979). In their analysis of the Epidemiological Catchment Area Study data, Robins and Przybeck (this volume) found that the onset of drug use prior to the age of 15 was the only consistent predictor of later drug abuse in the samples they studied. A later age of onset of drug use is usually associated with lesser drug involvement and a greater probability of discontinuation of use (Kandel 1976). Thus, the fourth goal in prevention is to delay the "age of onset of use."

A fifth and final outcome of possible concern is the prevention of use of particular categories of substances, such as tobacco, marijuana, alcohol, cocaine, or opiates. The selection of a Particular substance for prevention attention may reflect the categorical division of responsibility among public agencies. However, there is also an empirical reason for "picking your poison" in prevention research. Research by Kandel et al. (1978) has revealed stages of drug use. Somewhat different predictors appear salient in the initiation of the use of different types of drugs. Moreover, in a kind of Guttman scale fashion, the use of alcohol generally precedes the use of marijuana, while the use of marijuana appears to serve as a gateway to the use of other illicit drugs (Kandel 1978). Thus, there may be important etiological reasons for selecting a particular substance as the focus of prevention efforts, whether the objective is to delay onset, to prevent experimentation, to prevent regular use, or to prevent drug abuse.

The clarification of the outcome goal for prevention intervention may be essential if etiological research and theory are to guide prevention intervention, There is evidence that different patterns of drug use at different developmental stages have different etiological origins (Kandel 1982) and are associated with different patterns of current behavior. Robins' research (1980) has shown that occasional use of drugs (i.e., experimentation) does not appear to be associated with antisocial personality. In contrast, drug abuse (using the first definition above), especially in early and midadolescence, appears to be part of a general pattern of rebelliousness and nonconforming behavior (Johnston et al. 1978; Segal et al. 1979, 1980). which criminologists have called a "deviance syndrome" (Jessor and Jessor 1978; Elliott et al. 1982; Hindelang and Weis 1972) and mental health professionals have labeled antisocial personality (Robins 1980).

The epidemiological statistics also suggest the possibility that the experimental use of drugs by most adolescents is a different phenomenon from drug abuse which is associated with a deviance syndrome or antisocial personality. Annual surveys of high school seniors conducted by Johnston et al. (1984) have shown that 57 percent of the class of 1983 had tried marijuana and 40 percent had tried other illicit drugs. These rates of lifetime prevalence of illicit drug use among high school seniors are far greater than the estimated rate of chronic antisocial behavior among boys, which ranges from 4 percent to 15 percent depending on the age of the subjects and the type of behaviors included (Loeber 1982; Robins 1979; Rutter et al. 1970). The rates of drug experimentation are also far greater than the 5.5 percent prevalence of daily marijuana use found by Johnston in the class of 1983. It appears reasonable to hypothesize that behaviors with such different rates in the population may arise from somewhat different etiological roots. In sum, the etiologies of experimental drug use, regular drug use and drug abuse well may be different (Robins and Przybeck, this volume).

These considerations suggest that the prevention of drug abuse among adolescents may require a different strategy than the prevention of experimentation with drugs. Strategies which are adequate for preventing experimentation among those at low risk of engaging in serious antisocial behaviors may be wholly inadequate for preventing initiation and use by those who exhibit a "deviance syndrome." On the other hand, well-founded strategies for preventing drug abuse among those at highest risk for abuse may be inappropriate for those at risk only of becoming experimental users.

Etiological considerations may help guide the choice of the outcome to be sought in prevention. For example, the link between early initiation of use and subsequent drug abuse may argue for prevention efforts focused on delaying the age of onset of use as an outcome (Robins and Przybeck, this volume). Yet, the final decision regarding the question of what is to be prevented is a policy question involving issues which are more appropriate in the political than the scientific domain. For this reason this paper will not attempt a definitive answer to the question of what should be prevented, but will seek to distinguish etiological risk factors and prevention approaches as they relate to different outcomes of interest, especially as they appear related to adolescent drug experimentation as opposed to adolescent drug abuse.

CHILDHOOD PREDICTORS AND THE ETIOLOGY OF DRUG INVOLVEMENT: IMPLICATIONS FOR PRIMARY PREVENTION STRATEGIES

This section provides a brief review about known childhood risk factors for adolescent drug use and abuse. Despite the importance of identifying and addressing risk factors in prevention activities (Hawkins et al. 1980), there have been few studies that focus on childhood and preadolescent predictors of subsequent drug involvement. Though the age of onset for some drugs has been declining (Gersick et al. 1981). studies assessing precipitating factors for drug use generally focus on adolescents.
studies that do examine childhood predictors rarely differentiate drug-specific behaviors from general deviant, delinquent, or problem behaviors. Further, most of the literature regarding childhood antecedents predicts subsequent substance use rather than abuse (Gorsuch and Butler 1976).

Few researchers have attempted to integrate early predictors and correlates of substance use into a comprehensive theoretical framework (Kandel 1978). Robins (1979) asserts that results of longitudinal etiological studies predict the initial occurrence of problems, but not the course of problems once they occur, and adds that these results can rarely be translated into suggestions for intervention. Currently, there is not a generally accepted theoretical perspective which integrates knowledge of childhood predictors and which can serve as a basis for selecting strategies for intervention to prevent onset, experimental use, regular use, or abuse of drugs.

Early Antisocial Behavior

A number of studies have shown that problematic conduct early in life continues for certain groups of children (Loeber and Dishion 1983; Gersten et al. 1976; Ghodsian et al. 1980; Patterson 1982; Langner et al. 1983; Robins 1966; Werner and Smith 1977; West and Farrington 1973). As part of a constellation of antisocial behavior problems, drug abuse is predicted by previous patterns of antisocial behaviors.

Robins (1978) found that the greater the variety, frequency, and seriousness of childhood antisocial behavior, the more likely antisocial behavior will persist into adulthood. Proneness to problem behavior and a deviance syndrome have been posited to explain drug use (Jessor and Jessor 1978). The Jessors found that one could predict transitions of school aged children into drinking, loss of virginity, marijuana use, and delinquency about equally well from whichever behavior appears first, and concluded that similar antecedents foster a wide range of problem behaviors.

Early antisocial behavior has been found to predict adolescent substance use (Robins 1978; Johnston et al. 1978; Kandel et al. 1978; Wechsler and Thum 1973). In their sample of 1,242 urban, black first-grade students, Kellam and Brown (1982) found a positive correlation between first-grade male aggressiveness, especially when coupled with shyness, and the frequency of substance use 10 years later. Rebelliousness in children also is correlated with initiation of drug use (Smith and Fogg 1978).

While not focused specifically on drug use, Spivack's (1983) longitudinal study of high risk, early signs .of delinquency, similarly revealed that conduct disturbances in adolescence could be predicted from kindergarten and first grade signs of acting out, overinvolvement in socially disturbing behaviors, impatience, impulsivity, and acting defiant and negative.

Illicit drug use is related positively to other illegal behaviors (Johnston et al. 1978; Jessor et al. 1980). Delinquency has generally been found to occur prior to drug use (Johnston et al. 1978; Elliott et al. 1982). Frequent drug use is associated with lower personal controls against involvement in problem behavior, greater involvement in other forms of problem behavior, and lesser involvement in conventional behaviors (Jessor et al. 1980). Clausen has summarized the evidence: "One surmises that the identification of those who will be precocious in drug behavior might well be possible in terms of early signs of rebelliousness or precocity" (1978, p. 247).

The results of Loeber's (in press) review of patterns and development of antisocial behavior are consistent with the earlier suggestion that different etiological paths may be associated with early versus late initiation of drug use and with drug use as contrasted with drug abuse. For example, antisocial behavior is associated with early initiation of drinking. Youths who begin drinking late in adolescence are less likely to engage in

antisocial behavior. During adolescence, far more youths use psychoactive substances than engage in antisocial acts.Thus, initiation of substance use in late adolescence is probably not connected with antisocial behavior for a large majority of youths. In contrast, substance use in early adolescence is more fre uently associated with antisocial acts (Wechsler and Thum 1973). As previously noted, early initiation of substance use is linked with a higher risk for substance abuse (Robins and Przybeck, this volume).

In summary, the evidence of a positive relationship between childhood antisocial behavior and subsequent drug abuse is relatively consistent. However, there are several caveats which should be noted. First, the earliest age at which childhood antisocial behavior can be reliably identified as predictive of drug use or abuse is not clear. Stable predictions of behavior have been found from the age of school entry, but not before (Rutter and Giller 1983; Robins 1979). It also should be noted that conduct disorders in the preschool years do not appear predictive of adolescent antisocial behaviors in a normal population sample (Kagan and Moss 1962). This may reflect the normal developmental aspects of very early behaviors such as temper outbursts during the preschool years (Rutter and Giller 1983; Macfarlane et al 1962; Loeber, in press).

Second, childhood antisocial behavior appears to be less powerful as a predictor of either adult alcoholism (McCord 1981) or self-reported delinquency at age 18 (Farrington 1982) than is antisocial behavior in early adolescence (Loeber, in press). While serious antisocial behaviors in childhood appear to be virtually a prerequisite for serious antisocial personality problems (including drug abuse) in later life, less than one-half of the children with serious behavior problems will manifest these problems later (Robins 1978). Loeber and Dishion (1983) report that 30 to 40 percent of children engaging in maladaptive behavior at ages 4 through 11 continue the same behavior 4 to 9 years later (Farrington 1978, 1979; Ghodsian et al 1980; Glavin 1972; Janes et al 1979; Werner and Smith 1977). Thus, there is a considerable risk of false positives in identifying future drug abusers based on earlier behavior problems. Finally, it should be emphasized that these childhood antisocial behaviors appear most strongly related to serious behavior problems (including subsequent drug abuse) later in life and appear to be much less strongly related to occasional or experimental use of drugs or alcohol in late adolescence.

If the goal of prevention is to prevent serious maladaptive behavior associated with drug abuse in adolescence, then it may be desirable from an etiological perspective to focus prevention efforts on those youth who manifest behavior problems, including aggressive and other antisocial behaviors during the elementary grades. On the other hand, if the goal is to prevent experimentation with drugs, or to delay the age of experimentation in the general population, such highly focused efforts may be inappropriate.

The finding that serious antisocial behavior in elementary school children predicts subsequent drug abuse hardly seems to trace the problem to its ultimate etiological roots. What are the origins of the antisocial behavior? Several possible sources appear to have been ruled out. Though ecological relationships may exist, socioeconomic status and ethnfcfty do not appear to be major sources of severe antisocial behavior (Robins 1978). The literature on the effects of race/ethnicity, SES, and family structure on substance use is generally unsupportive, contradictory, or inconclusive (Gersick et al. 1981; Penning and Barnes 1982; Loeber and Dishion 1983; Kandel 1982). Kandel (1978) concludes that sociodemographic factors have little predictive power. Gersick and associates (1981) suggest that the research evidence supports a move away from a focus on sociodemographic factors to more integrative theories of social contexts and interpersonal transactions.

Family Factors

Family factors are strongly implicated in the etiology of adolescent drug abuse. To the extent that adolescent drug abuse is part of a constellation of deviant behaviors, including delinquency, the literature on the prediction of delinquency appears salient. Among the most important childhood predictors of delinquency are composite measures of family functioning (Loeber and Dishion 1983), parental family management techniques (West and Farrington 1973; Baumrind 1983), and parental criminality or antisocial behavior (Langner et al 1983; Loeber and Dishion 1983; Osborn and West 1979). Disruptions in family behavior management are a major mediating variable for antisocial behavior in children (Patterson 1982). Variables associated with antisocial problems include households that are disorganized and have poorly defined rules and inconsistent, ineffective family management techniques. In a sample of 195 boys, Loeber and Schmaling (in press) found that boys who engaged in both overt antisocial behaviors (fighting) and covert antisocial behaviors (e.g., stealing and drug use) came from families with the greatest disturbance in child-rearing practices.

Looking more specifically at adolescent drug use, positive family relationships, involvement, and attachment appear to discourage youths' initiation into drug use (Adler and Lutecka 1973; Wechsler and Thum 1973; Shibuya 1974; Jessor and Jessor 1977; Kim 1979). Kandel (1982) found that parental influence varies with the stages of drug use she identified. Parental role modeling of alcohol use is positively associated with adolescent use of alcohol, while the quality of the family relationship is inversely related to the use of illicit drugs other than marijuana. According to Kandel, three parental factors help to predict initiation into drug use: parent drug using behaviors (see also Kim 1979); parental attitudes about drugs; and parent-child interactions. The latter factor is characterized by lack of closeness (see also Mercer et al. 1976; Kandel et al. 1978; Kim 1979; Brooks et al. 1980). lack of maternal involvement in activities with children, lack of, or inconsistent, parental discipline (see also Braucht et al. 1973; Blum et al. 1972; Baumrind 1983; Penning and Barnes 1982), and low

parental educational aspirations for their children. Stanton and Todd (1979) and Ziegler-Driscoll (1979) suggest that familial risk factors include high rates of parental substance use, and a pattern of overinvolvement by one parent and distance or permissiveness by the other. Similarly, families with drug abusing children are described by Kaufman and Kaufman (1979) as ones in which fathers are "disengaged" and mothers are "enmeshed."

Baumrind (1983) classified parenting styles as authoritative, authoritarian, or permissive, and found that children who are highly prosocial and assertive generally come from authoritative families. She suggests that family antecedents which discriminate types of drug users include conventionality, family disruption, and parent non-directiveness. Reilly (1979) found that common characteristics of families with adolescent drug abusers include negative comnunication patterns (criticism, blaming, lack of praise), inconsistent and unclear behavioral limits, denial of the child's drug use, unrealistic parental expectations, family-self medication, and miscarried expressions of anger.

Some studies have associated parental substance use with drug use by adolescents. While Kandel notes that marijuana use by peers is a better predictor of subsequent involvement with drugs than parents' use (Kandel 1973, 1974, 1975), she found parental self-reports of substance use to be related to initiation of use by their adolescent children (Kandel et al. 1978). Similar findings have been reported for adolescent drinking habits (Rachal et al. 1980. 1982; Zucker 1979). A consistent correlation between adolescent drug abuse and parents' use of alcohol and other legal drugs also has been shown (Bushing and Bromley 1975; Lawrence and Velleman 1974). A review by Stanton (1979) showed that a disproportionate number of heroin addicts have. fathers with a drinking problem (Cannon 1976; Ellinwood et al. 1966), that marijuana users frequently have fathers who use alcohol and tobacco and mothers who use tranquilizers (McGlothlin 1975), and that parents of marijuana users have elevated rates of tranquilizer, barbiturate, and stimulant use (Smart and Fejer 1972). Importantly, Tec (1974) found that parental drug use in a rewarding family structure only slightly promotes extensive marijuana use, while in an unrewarding context there is a clearer association between drug use by parents and their children.

Little research has been conducted on other forms of parental behavior and adolescent drug use and abuse. Several studies have suggested a relationship between child abuse and delinquency (Timberlake 1981; Steele 1976; Pfouts et al. 1981; Garbarino 1981). When case records of abused and neglected children were reviewed over 12 years later, 30 percent were discovered to be delinquent or in need of supervision (Alfaro 1976). Excessively severe, physically threatening, and physically violent parental discipline have been associated with aggressive and destructive acts of delinquency (Deykin 1971; Shore 1971; Haskell and Yablonsky 1974). However, apparently no longitudinal studies assessing the impact of child abuse on subsequent drug use and abuse have been conducted.

While some researchers have found that non-intact families predict subsequent drug use (Robins 1980; Baumrind 1983; Penning and Barnes 1982), there is disagreement on this point. Family structure appears to be less important as a predictor of delinquency than attachment to parents (Nye 1958; Sederstrom 1978; Wilkinson 1974; Weis et al. 1980).

To summarize, the findings are consistent regarding the effects of the quality and consistency of family management, family communication and parent role modeling on children's substance use (Baumrind 1983; Patterson 1982; Stanton et al. 1982; Mercer et al. 1976; Kandel et al. 1978; Pennings and Barnes 1982). Given the consistency of these findings, family management, communication and role modeling represent risk factors which should not be ignored in developing theories of the etiology of adolescent drug initiation and abuse or in prevention research.

There is disagreement as to the relative strength of the early childhood predictors discussed earlier. Loeber and Dishion (1983) assert that, on the whole, composite measures of family management techniques appear to be stronger early age predictors of subsequent delinquency, while Robins (1980) asserts that prior misconduct is a stronger predictor of antisocial behavior than family disorders. It should be noted, however, that Robins did not have access to independent prospective measures of families' functioning and management. Langner and associates (1983) argue that prior antisocial behavior is a better predictor of later behavior, but that family environment variables are better predictors of later adverse outcomes in school or with the police. These differences in emphasis across studies may reflect different measurement approaches. Alternately, it is possible that early behavior is a more proximate variable to later behavior which mediates between family characteristics and the later behavior. Regardless, it would appear that interventions seeking to prevent either substance abuse by adolescents or the early onset of substance use should include a focus on family factors during preadolescence.

School Factors

The research on the relationship between school experiences in childhood and adolescent drug use has produced mixed results. Several researchers have attributed an independent effect to school failure as a predictor of drug abuse (Robins 1980; Anhalt and Klein 1976; Jessor 1976; Brooks et al. 1977; Galli and Stone 1975). Poor school performance is a common antecedent of initiation into drugs (Jessor and Jessor 1977; Kandel et al. 1978; Johnston 1973), and has been found to predict subsequent use and levels of use of illicit drugs (Smith and Fogg 1978). Drug users and juvenile delinquents appear to perform more poorly in junior and senior high schools than do nonusers and nondelinquents (Kelly and Balch 1971; Polk et al. 1974; Frease 1973; Senna et al. 1974; Simon 1974; Anhalt and Klein 1976; Jessor 1976), although this relationship has not been found among college students (Miranne 1979). Robins (1980) characterizes drug users as having average or better IQs but being underachievers.

What is not clear from the existing research is when, developmentally, school achievement becomes salient as a possible predictor of drug use. While underachievement and school failure have been positively linked to adolescent substance use and delinquency, Fleming et al. (1982) found that children who scored high on first-grade readiness and IQ tests exhibited earlier and more frequent use of alcohol and marijuana. These students were more than twice as likely to become frequent users. Teacher-rated learning problems for first-grade students were not related to future substance use when shyness and aggressiveness were controlled. Aggressiveness in the Woodlawn sample of first graders was invariably accompanied by learning problems, but learning problems frequently occurred without aggressiveness and did not alone predict subsequent drug use (Kellam and Brown 1982). Similarly, Spivack (1983; Spivack et al. 1978) determined that initial signs of academic achievement in the first grade were not predictive of subsequent conduct or delinquent disturbances. Other studies indicate that by the end of elementary school, low achievement, low vocabulary, and poor verbal reasoning are predictors of delinquency (Farrington 1979; Rutter et al. 1979) Kandel (1981) suggests that low school performance does not itself lead to drug use, but that the factors leading to poor school performance are related to drug involvement. We have already noted that first-grade teacher ratings of antisocial behaviors are good predictors of later drug abuse and delinquency. These findings suggest that social, not academic, adjustment is more important in the first grade as a predictor of later serious drug abuse. Academic performance appears to emerge in importance as a predictor sometime after the first grade. It is possible that early antisocial behavior in school predicts both academic underachievement in later grades and later drug abuse.

This suggestion is consistent with Spivack's (1983) results regarding the role of school failure in the prediction of delinquency. While early academic failure (in first grade) did not predict delinquency in Spivack's study, academic failure beginning in grade five did predict subsequent community delinquency among males. Spivack found that antisocial and maladaptive coping behaviors in earlier school grades contributed to academic failure in late elementary grades, which, in turn, contributed to subsequent misconduct and delinquency. Spivack (1983) concluded that academic failure in the late elementary grades exacerbates the effects of early antisocial behavior.

A second school factor related to drug use is a low degree of commitment to education. Students who are not committed to educational pursuits are more likely to engage in drug use and delinquent behavior (Hirshi 1969; Elliott and Voss 1974; Kim 1979; Friedman 1983; Galli and Stone 1975; Robins 1980; Brooks et al. 1977). The annual surveys of high school seniors by Johnston et al. (1981, 1982, 1984) show that the use of hallucinogens, cocaine, heroin, stimulants, sedatives, or nonmedically prescribed tranquilizers is significantly lower among students who expect to attend college than among those who do not plan to go on to college. Drug users are more likely to be absent from school, to

cut classes, and to perform poorly than nonusers (Brook et al. 1977; Kandel 1982; Kim 1979). Greater drug use has been demonstrated among dropouts (Annis and Watson 1975). Factors such as how much students like school (Kelly and Balch 1971), time spent on homework, and perception of the relevance of coursework also are related to levels of drug use (Friedman 1983). confirming a negative relationship between commitment to education and drug use, at least for junior and senior high school students.

Peer Factors

Association with drug-using peers during adolescence is among the strongest predictors of adolescent drug use (Akers 1977; Akers et al. 1979; Elliott et al. 1982; Hirshi 1969; Jensen 1972; Jessor et al. 1980; Kandel and Adler 1982; O'Donnell and Clayton 1979; Kandel 1982; Catalano 1982; Huba et al. 1979; Winfree et al. 1981; Meier and Johnson 1977; Ginsberg and Greenley 1978; Orcutt 1978; Smart et al. 1978; Jessor and Jessor 1977; Goldstein 1975; O'Donnell et al. 1976; Kaplan et al. 1982). Drug behavior and drug-related attitudes of peers are among the most potent predictors of drug involvement (Kandel 1978). Peer influences are particularly important for initiation into the use of marijuana (Kandel et al. 1978). Perceived use of substances by others is also a strong predictor of use (Jessor and Jessor 1978; Robins and Ratcliff 1979; Kandel et al. 1978). It has been reported that frequent users of marijuana have a greater orientation toward friends than parents, and greater perceived support and models for use (Jessor et al. 1978). Use of marijuana is strongly associated with use by closest friends and perceived support for use (Penning and Barnes 1982). Social settings favorable to substance use reinforce and increase any predisposition to use (Kandel 1978). Jessor et al. (1980) found that perceived environmental predictors (such as friends as models for use) accounted for twice the variance in drug use as compared to personality factors.

In their longitudinal study of the National Youth Panel, Elliott et al. (1982) found that social bonds to family and school influenced drug use indirectly through peer associations. Strong bonds to family and school decrease the likelihood of involvement with drug using and delinquent peers. They found only indirect effects of family and school bonding on drug use, and suggest that this reflects the time ordering of youths' experiences in the social contexts they encounter. The strength of bonding to family and school is determined before exposure to drug using peers in adolescence. However, the extent to which youths have become bonded to family and school is likely to be a factor in the selection of prosocial or drug using companions in early adolescence (Kandel et al. 1976, 1978; Elliott et al. 1982).

This suggestion raises an important question regarding the role of peers in the etiology of adolescent drug abuse, which has not been adequately addressed in existing studies: At what point do peers become important in predicting adolescent substance use? Researchers have begun to study childhood peer associations longitudinally into adolescence (Coie and Dodge 1983). However, little research has focused on preadolescent peer associations as

possible predictors of subsequent drug initiation or abuse. There is little empirical data to assess the potential for peer-focused interventions prior to the junior high school years, although the strength of the relationship between peer factors and adolescent drug use clearly supports the need for further research on the nature and etiology of peer influences prior to adolescence as these relate to drug initiation, use, and abuse.

Questions regarding the possible role of childhood peers in predicting adolescent drug use also relate to the question of the desired outcome of prevention efforts. Adolescent drug experimentation can be seen as a peer-supported phenomenon reflecting the increasing importance of peers during adolescence. On the other hand, adolescent drug abuse appears to be embedded in a history of family conflict, school failure, and antisocial behavior. How childhood associations with antisocial peers or, conversely, childhood isolation, may be possible predictors of drug abuse is not clear. Further research is needed on the relationship between peer associations prior to adolescence and subsequent drug use and abuse.

Attitudes, Beliefs, and Personality Traits

Individual personality traits, attitudes, and beliefs are variously related to substance use. Generally, a constellation of attitudes and beliefs indicating a 'social bond' between the individual and conventional society has been shown to inhibit both delinquency and drug use (Hirschi 1969; Hindelang 1973). The elements of this affective bond which have been shown most consistently to be inversely related to drug use are attachment to parents (Wohlford and Giammona 1969; Chassin et al. 1981; Krohn et al. 1983; Adler and Lutecka 1973; Wechsler and Thum 1973; Shibuya 1974; Jessor and Jessor 1977; Kim 1979); commitment to school and education (Krohn et al. 1983; Hirschi 1979; Elliott and Voss 1974; Kim 1979; Friedman 1983; Johnston et al. 1981); and belief in the generalized expectations, norms and values of society (Hindelang 1973; Akers et al. 1979; Krohn et al. 1983). Conversely, alienation from the dominant values of society (Jessor and Jessor 1978; Smith and Fogg 1978; Kandel et al. 1978; Kandel 1982; Penning and Barnes 1982) and low religiosity (Kandel 1982; Jessor et al. 1980; Gersick et al. 1981; Robins 1980) have been shown to be positively related to drug use.

Research also has shown a relationship between specific attitudes and beliefs regarding drugs and drug use initiation. Initiation fnto use of any substance is preceded by values favorable to its use (Kandel et al. 1978; Smith and Fogg 1978; Krosnick and Judd 1982).

A wide array of personality factors have been linked with early or frequent substance use. These include rebelliousness (Kandel 1982; Bachman et al. 1981; Goldstein and Sappington 1977; Smith and Fogg 1978; Green 1979) and nonconformity to traditional values (Gorsuch and Butler 1976; Jessor and Jessor 1977). Similarly, high tolerance of deviance (Brook et al. 1977; Jessor and Jessor 1975)) resistance to traditional authority (Goldstein and

Sappington 1977), a strong need for independence (Jessor 1976; Segal 1977); and normlessness (Paton and Kandel 1978) have all been linked with substance use. All these qualities would appear to characterize youths who are not socially bonded to society.

Smith and Fogg (1978) reported that nonusers scored highest,and early users lowest, on personal competence and social responsibility measures, such as obedience, diligence, and achievement orientation. The authors argue that personality characteristics discriminated between nonusers, early users, and later users of marijuana. Contradictory findings or weak correlations have been found for self-esteem (Ferguson et al. 1977; Ahlgren and Norem-Hebeisen 1979; Paton and Kandel 1978: Jessor and Jessor 1978; Smith and Fogg 1978; Kaplan 1978), locus of control, sensation seeking,and other personality dimensions. Wexler (1975) indicates that frequent users score lower on well-being, responsibility, socialization, self-control, tolerance, achievement, and intellectual efficacy. Penning and Barnes (1982) suggest an association between marijuana use and alienation, lower motivation, and sensation seeking.No evidence of psychopathology has been found for users as opposed to nonusers, except when users are very young (Anhalt and Klein 1976). Gersick et al. (1981) suggest that the personality characteristics of those with an early onset of use may differ from those who initiate use later, since use becomes normative with increasing age. This once again emphasizes the importance of clarifying the outcome of concern in seeking to use existing research as a basis for prevention programming. Generally, with the exception of rebelliousness and alienation, personality factors have been found to be less predictive of substance use than behavioral or interpersonal factors (Kandel 1978; Jessor et al. 1980).

THEORETICAL INTEGRATION OF THE ETIOLOGICAL RESEARCH

To effectively use the etiological research on risk factors for adolescent substance use and abuse in designing prevention interventions, the existing knowledge should be integrated into a theory with explicit assumptions and hypotheses. Moreover, the theory should be one of intervention, i.e., the theory should identify points at which prevention efforts should be targeted, given the empirical foundations, assumptions, and hypotheses of the theory.

A number of theories have been advanced to explain adolescent substance use (Lettieri et al. 1980). Kandel's developmental perspective (1982) suggests three stages of drug involvement, with different antecedents and influences associated with each stage. The key factors associated with drug use are parental influences, peer influences, beliefs and values, and involvement in certain activities. Interaction between individual characteristics and the matrix of social influences is emphasized, with responses to social influences viewed as functions of personal characteristics and situational factors.

Robins (1980) proposes that drug misuse can be viewed as a manifestation of a deviance syndrome. Closely related is Jessor and Jessor's (1977) notion of problem-behavior proneness. The Jessors associate attributes within each of three systems (personality, perceived environment, and behavior systems) with the occurrence and levels of problem behavior. Similar antecedents foster a wide range of problem behaviors. According to their model, the greater the degree of problem-behavior proneness, the greater the likelihood of drug use.

Kaplan and associates (1982) regard deviant responses, including drug abuse, as motivated by the development of self-rejecting attitudes in the course of normative interactions.
patterns are seen as alternatives to conventional means of achieving self-esteem and avoiding self-devaluing experiences. The adoption of particular deviant patterns is viewed as a function of the individual's history of experience, exposure, availability, and opportunity.

It appears reasonable from the evidence reviewed on childhood predictors of early initiation and abuse that adolescent drug abuse should be viewed from a developmental perspective. Early initiation as well as patterns of abuse can be considered responses to or results of experiences from birth through adolescence. Early antisocial behaviors, early experiences in the family, later experiences in school, and finally, interaction with peers all appear to be implicated in the etiology of drug use and abuse. From a developmental perspective, it can be argued that early experiences in the family are likely to influence social bonding to the family (Hirschi 1969), social and self-control (Reckless 1961), and subsequent experiences in school, as well as the likelihood that social bonds of attachment to school and commitment to education will develop (Bahr 1979). Similarly experiences at school are likely to influence the extent to which a youth will develop social bonds of attachment and commitment to prosocial activities and prosocial others (Schafer and Polk 1967; Hirschi 1969). The social influence of peers clearly is salient during adolescence ftself. If the process of developing a social bond to prosocial others and prosocial activities has been interrupted by uncaring or inconsistent parents, by poor school performance, or by inconsistent teachers, youths are more likely to be influenced by peers who are in the same situation and are also more likely to be influenced by such peers to engage in drug use (Elliott et al. 1982; Weis and Hawkins 1981; Kaplan et al. 1982).

A developmental perspective on drug use suggests that preventive interventions which seek to address only the peer/drug use linkage and which waft to intervene until adolescence may be misspecified. If the outcome of concern is drug abuse as opposed to experimental use, intervention at this stage in the development of drug using behavior may be too late to reverse a process that has already been set in motion as a result of prior experiences in family and school. On the other hand, if the concern is experimental use by a large proportion of adolescents, then preadolescent interventions that focus on social pressures of the adolescent peer group would appear to hold promise.

This developmental perspective has been integrated into a theory of antisocial behavior and its prevention, the social development model (Hawkins and Weis, in press; Weis and Hawkins 1981) which guides the prevention research conducted by these authors. The theory integrates social control theory (Nye 1958; Reiss 1951; Briar and Piliavin 1965; Matza 1964; Hirschi 1969) and social learning theory (Bandura 1973, 1977; Burgess and Akers 1966; Akers 1977; Akers et al. 1979; Krohn et al, 1981) and is similar in this regard to the work of others (Meade and Marsden 1981; Braukman et al. 1980; Johnstone 1981; Conger 1976, 1980; Linden and Hackler 1973; Johnson 1979; Elliott et al. 1982). In contrast to other models, this social development model seeks explicitly to serve as a basis for prevention interventions. The theory describes stages of development and identifies intervention approaches which would appear appropriate at each stage. Propositions from control theory are used to identify elements in the etiology of drug use and delinquency, as well as in the etiology of conforming behavior. Propositions from social learning theory are used to identify processes by which these patterns of behavior are extinguished or maintained.

In the theoretical synthesis of the social development model, a social bond to conventional society is viewed as necessary to prevent drug abuse (as opposed to experimentation). According to control theory, deviance is produced by a weak, broken, or absent bond to the conventional order. As operationalized by Hirschi (1969), the bond consists of attachment to conventional individuals, commitment to conventional lines of action, involvement in conventional activities, and belief in the legitimacy of the moral order. The stronger the components of the bond, the less likely it is that an individual will be free to engage in deviant behavior such as drug use. Empirical studies show that the elements of this social bond are negatively related to drug use. Therefore, an intermediate goal of prevention efforts should be to establish elements of the social bond between a youth and his/her environment in order to prevent the young person from engaging in drug abuse.

This theoretical synthesis extends control theory by suggesting that behavior patterns will be more or less deviant depending on the types of opportunities and social influences to which one is exposed, the skillfulness with which one performs in various activities and interactions, and the relative balance of rewards one receives from participation in these activities (Hawkins and Weis, in press; Hawkins and Catalano 1980; Weis and Hawkins 1981; Catalano 1982; Catalano et al. 1983). The rewards one experiences for behavior directly affect the likelihood that one will continue that behavior (Bandura 1972, 1977). These rewards are themselves a function of the opportunities available for participation in groups and activities, as well as the skills an individual applies in his/her activities and interactions. Prosocial behavior is predicted when youngsters perform skillfully in conventional settings and skillfully avoid unconventional settings. We hypothesize that prevention interventions will be most successful in inhibiting early initiation and subsequent abuse of drugs and alcohol when they increase youths' opportunities for involvement

in prosocial activities, youths' skills for participation in positive activities and social interactions, youths' skills to avoid participating in illicit interactions and activities, the skills of parents to effectively communicate with and set limits for their children, and parents' consistent support during their child's development.

Based on the etiological research reviewed earlier, the social development approach identifies three aeneral contexts in which the formation of the social bond occurs (family, school, and peer group). When youths develop opportunities for involvement in the family; when they develop the requisite social, cognitive, and behavioral skills to perform as expected in family interactions; and when they are rewarded consistently for adequate performance in the family, they will develop a bond of attachment, commitment and belief in the family. When parental family management practices are inconsistent, punitive, or ineffective and when parents are inconsistent in their involvement and interaction with their children, these three conditions are not likely to be present in the family, and a bond to family is not likely to develop.

Bonding to school is conditioned by the extent to which social bonds to the family have developed by the time the child enters school as well as by the extent to which the child experiences opportunities for involvement, develops skills, and is rewarded for skillful performance at school. Thus, both social and academic success at school appear to be prerequisites for bonding to school. Similarly, social bonds to peers, whether prosocial or delinquent, will develop to the extent that youths have opportunities for involvement with those peers, the skills to perform as expected by those peers and the rewards that are forthcoming from interaction with those peers. We do not suggest that strong bonds of attachment to family and school will preclude the development of strong bonds of attachment to peers as long as the norms of family members, school personnel, and peers regarding appropriate behavior do not conflict. However, like Kandel et al. (1978) and Elliott et al. (1982), we suggest that the formation of social bonds to family and school will decrease the likelihood that youths will develop early attachments to drug abusing peers in early adolescence, since we postulate that the behaviors rewarded in family and school and those likely to be rewarded by drug abusing youths are not compatible.

This theoretical synthesis would be incomplete if it ignored the fact that experimentation with tobacco, alcohol, and marijuana has become widespread among older adolescents. We have seen that drug experimentation is supported by attitudes and beliefs about the acceptability of alcohol and marijuana use under a variety of circumstances. Jalali and his colleagues (1981) note that many adolescents who use these gateway drugs are experimental or situational users influenced by their peers. It is apparent that adolescent peer influences can exert strong independent influences on use of the gateway drugs in spite of earlier family and school experiences related to social bonding. In fact, in Hirschi's (1969) study of junior and senior high school students, even those

with strong bonds to the social order were more likely to commit delinquent acts if they had delinquent friends. There appears to be an independent influence of peers on behavior during adolescence.

At this point, reconsideration of our original question regarding the outcome of concern in prevention is important. An hypothesis consistent with the etiological data is that experimentation with alcohol and drugs may be a form of adolescent individuation that is a separate phenomenon from drug abuse. Thus, relatively widespread experimentation among adolescents may be expected, within the existing broad cultural boundaries of the larger society (Baumrind, this volume). The social developmental perspective accounts for experimental drug use typical of otherwise conventional high school students. These students have strong attachments to other conventional students. However, when drug use is statistically normative (in late adolescence), the risk of loss of affection or approval from these peers because of drug use is low. While parents may disapprove of drug-using behavior, the peer group is the major mediator of rewards for high school aged youth. Experimental drug use appears as a likely outcome when low perceived risks or costs are coupled with the rewards for associating with drug-using but otherwise conforming peers, with the perceived rewards of use, and with a lack of skills to resist peer pressure to use while still maintaining peer approval. While strong bonds to family and school may prevent experimentation in some youth, for others they may delay the age at which this experimentation takes place, thereby reducing the risk that the experimentation will escalate to drug abuse. Further, the bonds may themselves limit the use of drugs in amounts, frequencies or situations in which the social bond would be compromised by use. In other words, these bonds may inhibit the development of drug abuse as defined earlier in this paper. These speculations on the dynamics of social bonding and peer influence suggest that even socially bonded youths may come under some peer pressure to use drugs during adolescence. Thus, strategies that teach youngsters to deal successfully with these social pressures should prevent or delay initiation and reduce the likelihood that these youths will proceed beyond experimentation.

On the other hand, it is likely that youths who have not become socially bonded to family and school as a result of family conflict, school failure, and aggressive behaviors, will be easily influenced by drug prone peers and will find little reason to resist pressures to initiate drug use early in adolescence. Nor will these youths have much reason to resist using drugs more frequently when encouraged to do so by peers. These are the youths who will likely use drugs to cope with stress, loneliness, boredom, school failure or other personal or social problems. In this group, drug use itself is likely to compound previous personal and social problems with problems related to chemical dependency, legal difficulties, and drug-related deterioration in performance in school, work and family roles. Prevention interventions that focus on creating conditions for social bonding would appear beneficial in the case of these youths at highest risk of drug abuse. Enhancing opportunities, skills, and rewards

for prosocial involvement should increase the likelihood that such youths become socially bonded to prosocial others and to prosocial lines of action. It is hypothesized that such social bonds should provide a stake in prosocial involvements which would reduce the likelihood of drug abuse.

As a foundation for prevention activities, the social developmental model implies that families, schools, and peer groups are appropriate objects for intervention, depending on the developmental stage of the child. Interventions that seek to increase the likelihood of social bonding to the family through alterations in the opportunity and reward structures available to children within families are appropriate from early childhood through .early adolescence. Interventions that seek to increase the likelihood of social bonding to school through alterations in the opportunity and reward structures of classrooms and schools, and by directly impacting the development of both cognitive and interpersonal skills, are appropriate if begun at some point during elementary school. Interventions that seek to increase social bonding to prosocial peers by increasing opportunities and rewards for positive peer interaction and by insuring the development of interpersonal skills are appropriate when youths approach and enter adolescence. The promise of peer focused strategies delivered earlier in development is less clear.

This developmentally focused prevention model is consistent with the existing empirical evidence reviewed earlier regarding the preadolescent etiology of drug use and abuse. The preponderance of prevention efforts has not been grounded in a clear and consistent theoretical base (Schaps et al. 1981). Thus, the model provides one framework for proposing and assessing interventions that seek to delay the onset of drug use, and/or to prevent continued use, and/or abuse, after initial experimentation.

PREVENTION INTERVENTIONS TARGETING CHILDREN

How do the most widely used prevention interventions with children address the etiological risk factors which have been identified above? The first response is that, until recently, very few drug prevention programs targeted preschool or even elementary school children (Polich et al. 1984). Only 6 percent of the programs reviewed by Schaps et al. (1981) served children ages 6 to 8 and 18 percent served youths aged 9 to 11. However, a trend toward earlier prevention programs is beginning to follow the downward trends in age of first use.

A number of typologies have been offered for categorizing prevention programs (Polich et al. 1984; Schaps et al. 1981; Hawkins et al. 1980). In earlier work, we identified 12 presumed causes of antisocial behavior and prevention strategies that address each cause (see figure 1). Prevention efforts in the drug abuse field have focused on a subset of these presumed causes. Importantly, several of the empirically supported factors in adolescent drug initiation and abuse (notably family management, communication and attachment and academic performance) rarely have been addressed by drug prevention programs targeting children. At

FIGURE 1
CAUSES OF DELINQUECY
AND ASSOCIATED STRATEGIES OF DELINQUECY PREVENTION[1]

PRESUMED CAUSE	STRATEGY	GOAL OF STRATEGY
PHYSICAL ABNORMALITY/ ILLNESS	BIOLOGICAL-PHYSIOLOGICAL -Health Promotion -Nutrition -Neurological -Genetic	Remove, diminish, control underlying physiological, biological or biopsychiatric conditions.
PSYCHOLOGICAL DISTURBANCE DISORDER	PSYCHOLOGICAL/MENTAL HEALTH -Epidemiological/early intervention -Psychotherapeutic -Behavioral	Alter internal psychological states or conditions generating them.
WEAK ATTACHMENTS TO OTHERS	SOCIAL NETWORK DEVELOPMENT -Linkage -Influence	Increase interaction/involvement between youth and non-deviant others; increase influence of non-deviant others on potentially delinquent youth.
CRIMINAL INFLUENCE	CRIMINAL INFLUENCE REDUCTION -Disengagement from criminal influence -Redirection away from criminal norms	Reduce the influence of delinquent norms and persons who directly or indirectly encourage youth to commit delinquent acts.
POWERLESSNESS	POWER-ENHANCEMENT -Informal influence -Formal power	Increase ability or power of youth to influence or control their environments, directly or indirectly.
LACK OF USEFUL WORTHWHILE ROLES	ROLE DEVELOPMENT/ ROLE ENHANCEMENT -Service roles -Production roles -Student roles	Create opportunities for youth to be involved in legitimate roles or activities which youth perceive as useful, successful, competent.
UNOCCUPIED TIME	ACTIVITIES/RECREATION	Involve youth in non-delinquent activities.
INADEQUATE SKILLS	EDUCATION/SKILL DEVELOPMENT -Cognitive -Affective -Moral -Informational	Provide individuals with personal skills which prepare them to find patterns of behavior free from delinquent activities.
CONFLICTING ENVIRONMENTAL DEMANDS	CLEAR AND CONSISTENT SOCIAL EXPECTATIONS	Increase consistency of expectations/ messages from institutions, organizations, groups which affect youth.
ECONOMIC NECESSITY	ECONOMIC RESOURCES -Resource maintenance -Resource attainment	Provide basic resources to preclude the need for delinquency.
LOW DEGREE OF RISK/ DIFFICULTY	DETERRENCE -Target hardening/removal -Anticipatory intervention	Increase cost, decrease benefits of criminal acts.
EXCLUSIONARY SOCIAL RESPONSES	ABANDONMENT OF LEGAL CONTROL/ SOCIAL TOLERANCE -Explicit jurisdictional abandonment -Implicit jurisdictional abandonment -Covert jurisdictional abandonment -Environmental tolerance	Remove certain behaviors from control of the juvenile justice system; decrease the degree to which youths' behaviors are perceived, labeled, treated as delinquent.

[1]Hawkins et al. 1980

the same time, some of the most common prevention approaches have targeted factors which appear to have little potential for preventing drug initiation or abuse given what is known about the etiology of these behaviors. These include drug information programs and recreational activities for high-risk youths.

Existing prevention strategies focusing on children can be categorized roughly as deterrence, which seeks to limit the availability of drugs; drug information/education; affective education, including programs focused on developing skills for coping with social pressures to use drugs; and activities/ recreation or "alternatives." The theoretical underpinnings and results of programs using these existing approaches are briefly reviewed below.

Deterrence Strategies

Deterrence strategies assume that drug use occurs because there is a low degree of risk or difficulty associated with obtaining and using drugs. These strategies seek to change the cost-benefit ratio by increasing the cost, or decreasing the benefit, of drug use primarily by restricting drug supplies or by crackdowns on drugs in junior and senior high schools. Theoretically, the strategies are an amalgamation of classic utilitarianism (Bentham 1961) and sociological exchange theory (Blau 1964). These theories view individuals as rational actors who attempt, through their actions, to maximize benefits and avoid costs such as the threat of discovery or legal sanctions (Zimring and Hawkins 1973; Gibbs 1975).

Legal proscriptions and controls have been successful in making certain drugs difficult to obtain and expensive relative to production costs (Polich et al. 1984). The effects of school crackdowns have not been systematically investigated, though the evaluation of New York's legal crackdown on drugs in the early 1970s showed no effects on heroin-related problems (Joint Commission on New York Drug Law Evaluation, 1978). Based on an examination of the economics of drug distribution, a recent Rand study concluded that more intensive deterrence through enforcement is not likely to affect substantially either the availability or the price of drugs in this country (Polich et al. 1984). The report noted that Federal expenditures for law enforcement have recently increased while expenditures for prevention have decreased. The authors conclude that this may be an inappropriate allocation of resources.

The etiological research does not suggest that adolescent drug abuse reflects a rational cost-benefit analysis into which the dollar cost and the legal risk of drug use is factored. The evidence regarding the links between adolescent drug abuse and other antisocial behaviors suggests, instead, that the legal prohibitions and crackdowns possible under the U.S. Constitution would have negligible effects on the behavior of the individuals most likely to abuse drugs: those who are not socially bonded to the existing social order and those whose peers are engaged in druq use. On the other hand, continuing pressure on supplies may

affect the prevalence of experimental use of illicit drugs by those socially bonded adolescents who do not wish to jeopardize seriously their standing in conventional society. It should be remembered that the deterrence approach can only limit, not eliminate, drug supplies. Therefore, it is not likely to have much additional impact on adolescent drug use in the absence of other prevention strategies.

Drug Information

Drug information programs assume that drug abuse results from inadequate knowledge of the negative consequences of drug use. This approach seeks to provide youths with information about drugs and their effects in hopes that such knowledge will make clear the risks of drug use and will, thereby, discourage use. While drug information programs dominated early drug abuse prevention efforts (Schaps et al. 1981). these programs did not address the risk factors for adolescent drug use identified in etiological studies. While evaluations have shown that the programs were effective in increasing knowledge about drugs, the evaluations have not shown desired effects on drug use behavior (Janvier et al. 1979; Kearney and Hines 1980; Polich et al. 1984; Schaps et al. 1981). Stuart (1974) and Grizzle (1974) found that the drug information programs which they evaluated not only increased knowledge regarding drugs, but also increased initial experimentation with drugs.

The association between recent decrements in the prevalence of daily marijuana use among high school seniors and increases in seniors' concerns about the health risks of marijuana has led Johnston (this volume) to speculate that providing youths with information regarding the health consequences of drug use may yet hold prevention potential. However, to date, there is little evidence to suggest that drug information programs alone will prevent other drug experimentation or drug abuse. Information on health consequences is often included in the decision-making and skills-oriented programs discussed in the next section. The use of drug information may hold greater promise in such programs.

Skills Strategies

Skills strategies assume that drug involvement results from deficits in personal and interpersonal skills. A wide range of personal characteristics has been targeted by such programs, including low self-esteem, lack of clear value positions, poor interpersonal communication skills, inability to solve problems and make decisions, inability to cope with stress, and a lack of skills to recognize and cope with pressures to use drugs. A potpourri of approaches has been aggregated under this label. These approaches focus on different presumed causes of drug abuse, though all are consistent in viewing the problem as a deficit in the potential user. The difference among skills programs is often one of emphasis. There is some overlap in content across most programs. Nevertheless, it is worth separating the different strands here, given differences in the extent to which they appear grounded in etiological theory and supported by evaluation results.

Values clarification approaches (Goodstadt 1978) and programs which seek to prevent drug abuse by improving self-esteem do not appear strongly supportable by etiological research (Gersick et al. 1981; Kandel 1978). While some evidence exists which links initiation of marijuana use to diminishing self-concept (Kaplan et al. 1982) continued use of marijuana appears to be associated with an increase in self-esteem (Kaplan 1980) . These findings suggest that strategies which attempt to improve self-esteem prior to the onset of drug use may, at best, delay the onset of use among nonusers. However, those already using drugs would not appear to benefit from a strategy aimed at increasing self-esteem.

Evaluations of values clarification and self-esteem programs for elementary grade students have produced varying outcomes. Magic Circle was implemented with third and fourth graders in the Napa project (Moskowitz et al. 1980; Schaeffer et al. 1982). This program involved small groups of students in discussions which sought to encourage the expression of thoughts and feelings. The goal was to increase self-esteem and positive regard for peers. No consistent pattern of positive effects was found for this intervention over a 2-year period. (Unfortunately, it is difficult to determine the extent to which this failure resulted from a weakness in the intervention method itself.) Group discussion, as in Magic Circle, has been used as the placebo intervention in numerous tests of behavioral skills training interventions and does not appear to be an intervention method with great potential for changing behavior, no matter what the topic (Ollendick and Hersen 1979).

A drug education program in four elementary schools in Appleton, Wisconsin, similarly sought to enhance self-esteem, improve decision-making skills, cultivate a healthy attitude among students regarding drugs, and provide accurate drug information (Kearney and Hines 1980). Classroom activities were provided by trained teachers in grades two through six. Teachers were asked to use the program for at least 1 hour per week for the academic year. In contrast to the Napa results, self-esteem gains favored the experimental groups at each grade level, although only the sixth-grade and total-group differences were significant. Decision-making ability gain scores also favored the experimental group at each grade tested (four through six), although not significantly in the fifth grade. Student attitudes toward drugs were significantly influenced in grades two and three, although improvements in later grades were not significant. While changes in attitudes and self-esteem were demonstrated in this study, drug use outcome measures were not reported. Thus, while it appears possible to affect self-esteem and attitudes toward drugs in elementary school, the relationship between these variables and later drug use remains unclear.

Interventions which seek to promote interpersonal competence in order to reduce impulsive and inhibited behaviors in children appear more promising, given the relationship between early antisocial behavior in children and subsequent drug abuse (Kellam

and Brown 1982). The etiological research suggests that such programs should be targeted at the early school grades when these behaviors are evident. A program of this type was implemented experimentally in Philadelphia in nursery school and kindergarten with black, low SES 4- and 5-year-old children (Spivack and Shure 1982). The program involved games, discussion and group interaction techniques focused on listening to others, and empathizing. Children in the experimental groups met for 12 weeks in small groups and were taught to consider solutions and consequences of various situations and actions by means of puppets and role play.

Subjects were studied over a period of 2 years. Results showed that training increased cognitive problem-solving skills among adjusted, inhibited, and impulsive children. Children trained in the program showed better adjustment. The impulsive and inhibited children demonstrated more improvement than the control group members. Trained children were less likely to exhibit impulsivity or inhibition, were better liked by their peers, and showed greater awareness of others in distress. While not specifically designed to prevent drug abuse, this program addresses childhood aggression, a childhood predictor of subsequent drug problems. The positive short-term effects on antisocial behavior suggest that this approach may hold promise for drug abuse prevention, although evidence of long-term effect on drug use has not been produced.

A major focus of some skills programs has been to teach children decision-making skills regarding drug and/or alcohol use. An example of a program emphasizing this approach is the "Here's Looking at You" curriculum, designed to help youths find responsible ways of dealing with alcohol in their environment. This curriculum was implemented and tested with students in grades 4 through 12 in five school districts (Mauss et al. 1981). The curriculum contained components aimed at enhancing knowledge about alcohol. self-esteem, coping, and decision-making skills. Self-contained teaching units were designed for each grade level. Schools were assigned to experimental and control conditions, and students were followed up over a 3-year period. Exposure to project practices varied from 1 to 3 years. The most encouraging longitudinal results were found for students who began the program in grade six and continued through grade eight. In addition to a clear impact on knowledge and information retained by students about alcohol and alcoholism, the evaluators found observable improvements in self-esteem and some of the decision-making skills, which were sustained across time. The results for this cohort showed persistent impact upon problem drinking (as reported by students), but not on the quantity or frequency of alcohol use. This suggests that the curriculum may reduce alcohol abuse.

The evaluators concluded that the results argued for decision-making skills training before junior high school entry. They suggested that if the cognitive and affective traits addressed by curricula like "Here's Looking at You" can be enhanced before junior high school, and prior to the establishment

of drinking-related attitudes and behaviors, they may be important determinants of later drinking behavior.

A major contribution of this study was an explanation of the relative proportion of variance in outcomes accounted for by the curriculum as opposed to other variables. Regardless of the drinking behavior studied (i.e., problem drinking, monthly quantity/frequency of use, or annual quantity/frequency of use), social variables relating to parental, peer, and religious influences explained more variance than the curriculum at all grade levels investigated. This finding supports an emphasis on family and peer focused prevention.

The evaluators also noted that positive school influences appeared to lose ground less rapidly to peer influences when youths were exposed to the curriculum, suggesting a potential influence of the curriculum on experimental drug use. They concluded:

> School-based prevention curriculum programs may not be able to prevent the increase of certain "natural" tendencies among teenagers toward boundary-testing with respect to alcohol and many other things. However, such prevention programs in the schools may well be able to inhibit or blunt such tendencies. (Mauss et al. 1981, p. 37).

The suggested use of such curricula prior to junior high school might enhance the effect on drug initiation and experimental use.

The final approach implemented under the general category of skills strategies assumes that adolescent drug use results from the inability of adolescents to recognize and resist social influences from peers and others to use drugs. Theoretically, these approaches are consistent with differential association and social learning theories. From an etiological perspective, they focus on one of the most proximate correlates of adolescent drug initiation, peer influence, while also focusing on the influence of parents and the media. They seek to assist preadolescents and adolescents to identify peer and other pressures to use drugs, to develop skills to resist such pressures, to develop constructive alternatives to the proffered drug experience, and to deal with the stress engendered by these experiences (Gersick et al. 1981).

Many social influence approaches involve efforts to change the existing norms favorable to drug use among adolescents and to decrease the complacent acceptance in our society of widespread substance use. Various efforts to change norms, including school and community awareness and media campaigns, have been shown effective in the prevention of heart and lung disease (Hurd et al. 1980; Maccoby et al. 1977; McAlister et al. 1979; Meyer et al. 1981).

Positive effects for school-based programs in preventing and delaying smoking have been shown for social influence approaches (Evans et al. 1978, 1979, 1981; Johnson 1982; McAlister et al. 1979; Perry et al. 1980) and for programs that utilize such

approaches within a broader focus on social skills, such as decision-making and communications (Botvin 1982; Botvin and Eng 1980; Schinke and Blythe 1981). These interventions have frequently been delivered by age contemporaries, whether via videotapes (Evans et al. 1978; Hurd et al. 1980) or live (McAlister et al. 1979; McAlister et al. 1980; Perry et al. 1980). They have focused predominantly on sixth through eighth grade students in hopes of reaching students just prior to onset of smoking.

The positive results of these approaches to smoking prevention have encouraged suggestions regarding their utility for prevention of adolescent alcohol use (Gordon and McAlister 1982) and other drug use (Polich et al. 1984). While there is preliminary evidence of short-term effectiveness for preventing alcohol and marijuana initiation (Botvin et al. 1984), the effectiveness of the strategy for preventing the use and abuse of psychoactive substances beyond tobacco is not yet established. Again, the question of defining the outcome variable of concern is critically important for assessing the likely promise of this strategy. On the one hand, the correlates of smoking initiation (Hansen et al. 1983) parallel those for the initiation of marijuana (Kandel 1978). Thus, given its apparent successes in reducing smoking, the strategy may hold promise for delaying and preventing widespread experimentation with other drugs, such as marijuana. On the other hand, it is not clear that the strategy will reduce the likelihood of adolescent drug abuse. It does not address the family, school, or behavioral predictors of drug abuse. Moskowitz (n.d.) cautions that successful outcomes for cigarette smoking prevention may, in part, be due to the current social climate unfavorable to smoking.

In summary, the evidence on skills trainlng programs appears mixed. There appear to be several reasons for the variability in outcomes. First, all skills programs appear to assume that young people need to acquire personal and interpersonal skills in order to function effectively without using drugs. However, different programs emphasize different skills. Programs that focus predominantly on clarifying values and enhancing self-esteem find little support in the etiological literature and have not shown effects on drug using behavior. Programs that help children to develop interpersonal skills to achieve their goals without resorting to antisocial behavior address an important factor in the etiology of adolescent drug abuse. However, long-term effects of such programs on drug abuse have not been reported. Programs that teach youngsters skills for decision-making and consequential thinking have received some support from evaluation research when initiated prior to the formation of attitudes and behavior patterns regarding these drugs. Conceptually, such decision-making strategies appear targeted more on drug experimentation in the broad population than on those antisocial youths most likely to become serious drug abusers, although the "Here's Looking at You" curriculum showed some effects on early self-reported problem drinking (Mauss et al. 1981). Finally, programs that teach youths to resist peer pressures to use drugs have been shown effective in smoking prevention when targeted on sixth through

eighth graders. These programs appear to address factors related to adolescent initiation and experimentation more than the etiological predictors of serious drug abuse.

A second source of the variability in outcomes concerns the intervention technologies used in these programs. These have ranged from discussion groups (Magic Circle) to behavior skills training approaches (Schinke 1981) using instruction (Wolpe 1969), modeling (Goldstein et al. 1980; Brieston, et al. 1975; Pentz and Kazdin 1982; Perry et al. 1980), role playing (Hurd et al. 1980; McFall and Marston 1970; Ollendick and Hersen 1979), and training to generalize behavior (Goldstein and Kanfer 1979). The behavioral skills training approaches have been used predominantly in programs focused on resisting peer pressure and on developing decision-making skills. They have not been used in evaluated programs focused on values clarification and self-esteem. Since behavioral skills training techniques have been shown to be more effective than discussion alone, it is difficult to separate the effects of intervention techniques from program content.

Finally, variability in outcomes undoubtedly reflects variability in program implementation. Few evaluations have carefully monitored and reported actual implementation of the programs and levels of exposure of subjects to the interventions. Thus, it is often impossible to determine whether an observed outcome reflects the theoretical soundness of an approach or the fidelity of implementation of the approach.

Activities/Alternatives Approach

This strategy focuses on the provision of alternative activities to children in order to fill unoccupied time with productive and valuable nondrug related activities. A wide range of activities from recreational programs and Outward Bound adventures to the creation of projects and responsible roles for students in schools have been undertaken under this broad label. Again, some of these approaches, such as recreational programs, appear little supported by research (Janvier et al. 1979). Approaches that emphasize the creation of opportunities for more responsible and age appropriate involvement in family, school, peer groups, and the community may hold promise for increasing social bonds between young people and their social environments, which should inhibit deviant behavior.

Frequently, alternative components have been implemented in combination with other strategies. As drug abuse prevention approaches, they have not been consistently supported in evaluative studies (Schaps et al. 1983; Kim 1981). In the Napa project, Schaps et al. (1983) found that two alternative programs implemented with junior high students, a cross-age tutoring program and the operation of a school store, failed to produce positive outcomes regarding drug involvement or to enhance students' attitudes toward self or school.

The Charlotte Drug Education Center Ombudsman prevention program was tested with 1,000 fifth and sixth grade students (Kim 1980). Through a three-phase curriculum, students learned self-awareness

and interpersonal communication skills, and then applied these by planning and carrying out a project within their school or community (such as peer counseling or a school cleanup). The program goal was to promote self-esteem, prosocial attitudes, and positive attitudes toward school. Results of the nonexperimental study indicated that the program was ineffective with regard to cigarettes, alcohol, and marijuana, but it did result in lowered use of other drugs among participating students. The Ombudsman program was found to be more effective with the younger cohort. The evaluator concludes that "attitudinal or behavioral modifications are easier when intervened by a valid program with younger students." (Kim 1981, p. 362).

An earlier evaluation of Ombudsman program effects on two cohorts (grades five and six and seven through nine) demonstrated that six out of seven high risk attitudinal scales showed positive improvements among experimental subjects, but the magnitude ot change was small (Kim 1979). Again, this trend was less marked with the older age group.

PLANNING PREVENTION FROM AN ETIOLOGICAL BASE

Few of the prevention programs described above address the most important childhood predictors of adolescent drug use and abuse. None of the evaluated drug focused prevention programs for children we have reviewed have directly addressed family functioning (i.e., family management skills), conduct disorders, aggressive or shy traits in children, or academic failure. The prevention programs which have been evaluated have addressed only a subset of the etiological risk factors for drug use and abuse. The most consistently addressed predictor has been the influence of adolescent peers on drug use during early adolescence. We are aware of no evaluations of the drug abuse prevention effects of etiologically based strategies which address the earlier childhood predictors of adolescent drug abuse.

If we are serious about using etiological research to guide prevention intervention research, then it would appear that additional prevention experiments are warranted. These should target the family predictors of later drug use, specifically family management and family communication variables (especially in families with antisocial and substance abusing parents), conduct disorders and antisocial behaviors in elementary school children, and academic underachievement and school failure in the elementary and middle school grades. Several existing approaches for drug abuse prevention with children appear to hold promise, but apparently have not been implemented or evaluated for drug prevention effects.

Prevention Programs Serving Preschool Children

As noted above, antisocial behaviors such as a combination of aggression and shyness in boys observed in the first grade are predictors of drug use patterns in adolescence. We have seen that composite measures of poor family management and communication

factors are also early predictors of drug abuse. These data suggest the promise of intervention during the preschool and kindergarten years in cases where these risk factors are present. We have already noted the promise of Spivack and Shure's (1982) cognitive interpersonal skills training as an approach to reducing aggressive and other antisocial behaviors in very young children.

A second promising approach is the combination of a preschool program that teaches young children interpersonal skills and assists parents to develop skills in family management, consistent interaction, and reinforcment of their child's learning. Such a combined approach should be targeted at families at high risk for drug abuse. In fact a number of experimental early childhood education programs of this type were initiated in the 1970s and 1970s. Overall, they have shown promise in impacting variables related to adolescent drug use (see Lazar and Darlington 1982 for a meta-analysis of 11 of these programs). To our knowledge, these programs have not been evaluated for drug abuse effects. Nevertheless; the results of a 17-year delinquency focused followup study of one of these programs suggest that these approaches should be investigated for drug abuse prevention potential.

The Perry Pre-School Intervention Project (Berrueta-Clement et al. 1983) provided 123 low-income black children with 1 to 2 years of preschool education and weekly home visits. Children at high risk of school failure or early placement in special education were randomly assigned to treatment or control conditions, and were followed up at ages 14, 15, and 19. The preschool program aimed at enhancing intellectual and social development. Classes were staffed by trained teaching teams and had a low staff-child ratio. Teachers visited mothers and children in their homes for 1½ hours each week.

Results of the long-term followup study showed that when compared to a control group, preschool participation was associated with lower rates of involvement with the legal system, lower arrest rates, and a lower number of self-reported offenses for four categories. Preschool participants also had higher rates of successful completion of secondary school, higher rates of postsecondary education or vocational training, higher grade point averages, higher employment rates, and fewer teenage pregnancies. The results indicate that preschool participation with parent education may reduce levels of delinquent behavior. However, no drug-specific measures were reported in the study.

Despite the dearth of preschool programs for the prevention of drug abuse, there is an obvious advantage to targeting this age group. Children and families can be reached before risk factors become well established. Disadvantages of targeting preschool children include the difficulty of recruiting and reaching children and parents at highest risk. Robins (n.d.) has addressed this problem by suggesting that such an intervention be targeted to the children of mothers who have been in contact with human service agencies as a result of antisocial behaviors. Another

drawback involved in testing this strategy concerns the number of subjects and length of time needed to assess program effects on drug abuse. One cost-effective approach to exploring the promise of these preschool programs for drug abuse prevention would be to conduct a retrospective followup of one or more of the experimental preschool programs initiated in the 1960s and 1970s similar to the delinquency followup reported by Berrueta-Clement et al. (1983).

Elementary schools provide a second base for prevention intervention. Programs need not necessarily be school focused. However, service delivery through the schools may be key to reaching children successfully without excessive cost. School-based prevention programs have the following advantages.

1. Teachers have routine daily contact with children, thereby insuring access to the target population.

2. Studies have shown that teacher ratings are good predictors of existing and future behavioral problems (West and Farrington 1973; Loeber and Dishion 1983). thus, teachers can provide low cost assessment of which children are at risk of future drug abuse and in need of special services.

3. In elementary schools, nearly the entire population, including high risk groups, is accessible.

School-Based Family Focused Prevention Services

Family focused prevention services implemented through the schools appear promising as a primary prevention strategy', especially with children and preadolescents. We have previously noted the importance of family factors in the early socialization of children (Hawkins and Weis,in press) as well as the strength of family variables as childhood predictors of subsequent drug problems (Kandel 1978; Baumrind 1983). Highly developed social learning approaches to improving family management skills have been implemented and evaluated (Patterson 1982; Fraser and Hawkins, in press). These studies have demonstrated successful outcomes in treating aggressive behavior of children (Patterson 1982; Reid 1975; Fraser and Hawkins, in press).

The family component of a longitudinal experimental prevention project, which we are currently conducting in Seattle, has been successfully implemented with experimental students and their families in 11 participating Seattle schools. Three family-focused components have been offered to the experimental elementary school cohort starting in the first grade. Home-School Liaison Specialists have been assigned to visit schools and hones of experimental students to increase positive communication and cooperation between parents and school personnel. The purpose of home visits was to communicate teachers' expectations to parents and to initiate positive communication from school to home. Home-School Liaison Specialists also arranged with teachers to

hold small group coffees at the school during school days, so that visiting parents could see their children in the classroom and get to know teachers in a supportive atmosphere.

The second family focused service consisted of a series of parent training classes held at the school over a 3-year period. These classes taught parents family management skills as well as ways to help their children do well academically. Preliminary results indicate positive behavioral and academic changes among experimental students (Hawkins and Sumi, in preparation).

Conflict resolution services are also offered. These services are provided to families of project students experiencing academic or behavioral problems in school. The goals of the intervention are to facilitate parent-teacher communication and collaboration in the child's education and socialization, and to promote more effective family management practices to create a supportive and consistent family environment for the child's development. Moderate success has been demonstrated for intervening variables in preliminary outcome evaluations (Hawkins and Brown, in preparation). While approaches focused on enhancing family management skills and the family's role in increasing students' academic performance would appear to address early predictors of drug abuse, no rigorous evaluations of these approaches for drug abuse prevention have been completed.

Strengths of a school-based family focused prevention approach are a strong etiological family risk factor base, the existence of tested intervention technologies, the ability to identify high-risk families through the schools, evidence that such high risk families can be reached through the schools, and the ability to offer family services to the general school 'population while intensively recruiting high-risk families for participation. Disadvantages include the difficulty of recruiting those families most in need of services, the costs involved in intensive family training models, and the possibility that the optimal time for intervening with families to establish healthy patterns of functioning might be before the child enters school. Despite the potential benefits of family strategies, Schaps et al. (1981) found that only 4 percent of the prevention programs they reviewed implemented family focused strategies. The expanding knowledge of family-related correlates of drug abuse and technologies to enhance family functioning make this strategy worthy of experimental research.

School-Based Instruction Focused Prevention Services

Academic failure appears to emerge as a predictor of drug abuse later than first grade. With children in later elementary and junior high grades, strategies which increase academic success and which provide interpersonal competency skills may address an important risk factor for drug abuse.

The Napa project (Schaps et al. 1983) included Effective Classroom Management as an inservice teacher training program that provided

elementary and junior high teachers with training in communication, classroom management, and self-esteem enhancement techniques. The goal was to make the classroom more responsive to students' affective and cognitive needs. The outcome evaluation of this intervention failed to show positive results or significant changes in teaching styles (Schaps et al. 1983). A cooperative learning technique called Jigsaw organized students in small learning groups and assigned them to teach the members of their groups an essential piece of the curriculum. Even when well implemented, positive effects were not found on student outcomes, (Schaps et al. 1983). One possible interpretation of these results, given Robins' findings regarding academic underachievement and drug abuse (1978), is that if classroom approaches are to have the desired effects on the student academic performance, they should teach instructional methods which insure academic success for those students who are performing below their ability levels. Our longitudinal prevention experiment in Seattle includes a classroom focused component of this type. Three classroom focused instructional interventions have been implemented in second and third as well as seventh and eighth grade experimental classrooms. They are proactive classroom management, interactive teaching, and student team or cooperative learning techniques. The interventions seek to introduce systematic changes in classroom instructional practices that will increase the proportion of students who experience academic success, increase the likelihood that students will develop commitments to educational goals, increase students' attachments to teachers and nondeviant peers, and increase students' beliefs in the fairness of school (Hawkins and Lam 1983).

Interactive teaching requires that students master clearly specified learning objectives before proceedings more advanced work. Grades are determined by demonstration of mastery and improvement over past performance, rather than in comparison with other students. Proactive classroom management seeks to establish an environment which is conducive to learning and which promotes appropriate student behavior, minimizing disruption to classroom learning activities. Teachers are taught to give clear and explicit instructions for student behavior and to recognize and reward attempts to cooperate. Classroom routines that will set up a consistent pattern of expectations between the teacher and students are established by the teacher at the onset of the school year. To minimize classroom disruptions which decrease opportunities for learning, the "law of the least intervention" is applied (Cummings 1983). Rather than insisting on quiet before teaching or stopping instruction to deal with minor misbehavior, the teacher selects and applies the minimal sanction necessary to maintain the flow of the lesson in the face of misbehavior.

Successful mastery of learning tasks, student motivation, positive student attitudes toward teachers and schools, and student self-esteem are greater when students learn in cooperative classroom situations rather than competitive or individualistic ones (Johnson and Johnson 1980; Slavin 1979). In student team learning, the attainment of individual student goals also depends

on the success of other students. This encourages students to influence one another to do their best academically. When students work in groups and their rewards depend on the quality and quantity of their group efforts, the efforts of the individual student and those of the group reinforce each other. Student team learning creates a general classroom norm favoring learning and academic performance (Slavin 1979).

Results of the first year of experimental intervention in Seattle using these methods have shown desired relationships in the seventh-grade sample between the instructional methods, student achievement in math, liking math, and rates of expulsion and suspension from school for behavior problems (Hawkins and Lam 1983). When analyzed separately, these effects were found for low achievers (Hawkins and Doueck 1984). Interestingly, the use of the teaching practices also appears to be associated with lower rates of self-reported use of drugs at school during the seventh grade (Hawkins and Lam 1983).

While the drug abuse prevention effects of instruction focused classroom interventions are not yet known, this approach would appear to be worthy of investigation as a prevention strategy, given the link between poor academic performance and drug abuse.

Advantages of classroom-focused prevention services are that they can be easily implemented at relatively low cost with existing personnel, that a technology is available for improving academic achievement, and that serving the whole classroom may simultaneously improve educational opportunities for both the general population and high-risk students. One caution regarding the use of this approach with younger children is that the relationship between early school failure and later drug use is not as well established as is the relationship of academic failure to drug use in junior high school. Another caution is that improved classroom instructional practices may not affect those students having the most academic difficulties, though our preliminary results in this regard appear promising (cf., Hawkins and Doueck 1984). Finally, it must be noted that a major previous attempt to implement classroom interventions for drug abuse prevention was not successful (Schaps et al. 1983).

School-Based Peer Focused Strategies

In Hirschi's (1969) study of junior and senior high school students, even those with strong bonds to the social order were more likely to commit delinquent acts if they had delinquent friends. How can we account for the independent influence of deviant peers on behavior? Hirschi (p. 170) suggested that control theory fails "to incorporate some notions of what delinquency does for the adolescent."

In a previous study, we examined the social networks of drug abusers before participation in residential treatment (Hawkins and Fraser, in press). We found that drug abusers viewed their drug using network members as friends whom they liked to see and

trusted; yet, at the same time, they viewed these same individuals as less worthy role models than more conventional people.

These findings suggest an answer to the question regarding the independent influence of deviant peers on behavior. The finding that drug users value other drug users less highly than conventional others as role models adds support to the assumption of control theory that there exists widespread agreement on cultural norms. Even highly deviant drug abusers appear to recognize that, while they may like seeing their drug using friends, their behavior is not something to be emulated. This finding does not support the view of differential association theory that deviant subgroups in society are simply adhering to the normative standards of their subculture which are at odds with conventional standards.

Second, the data suggest the rewards that association with drug users may produce <u>for</u> individuals. Drug abusers report that they like seeing other drug abusers. Drug using network members provide social reinforcements that lead to continued relations even if drug using associates are not necessarily perceived as the most desirable models for one's own behavior (Hawkins and Fraser, in press).

These findings regarding adult drug abusers may be paralleled among adolescents. When youths do not have access to more socially desirable associates, and when they cannot associate with those after whom they might choose to model themselves, they may find rewards and reinforcements in associating with those whom all may agree are less desirable friends, i.e., youths who have turned to frequent illicit drug use and other forms of deviant behavior. In short, youths may share the perspective that drug abusing groups are of lower status than other groups, and yet still become involved in such groups because they do not have access to higher status groups. Such low status groups provide rewards in the form of camaraderie and shared activities. Youngsters who have not been bonded to prosocial others may receive rewards from associating with drug abusing peers who encourage their own drug use in spite of the realization that these associates' behavior is not to be emulated.

To the extent that this view of peer influence and adolescent drug use is correct, it suggests the importance of strategies that assist youths who are entering adolescence to find opportunities for involvement and interaction with those whose behavior is "worthy" of emulation and to develop the requisite skills necessary to interact effectively with these others to produce rewarding interactions. In short, peer focused strategies should seek to provide opportunities, skills, and rewards that will ensure social bonding to prosocial peers.

Current peer-focused strategies that teach youths to resist peer pressure to use drugs may be more effective in preventing drug abuse if broadened to include a focus on increasing the

opportunities, skills, and rewards for participation with prosocial peers.

We do not know whether peer-focused programs should be initiated in earlier school grades rather than at the expected point of onset of drug initiation. This question arises in part from the lack of information in existing etiological studies regarding the relationship between peer associations in elementary grades and subsequent drug abuse.

THE ETIOLOGICAL RESEARCH NEEDED FOR PREVENTION INTERVENTIONS TO ADDRESS CHILDHOOD RISK FACTORS

Prospective longitudinal studies of childhood development through adolescence continue to be needed. The problem is to find a way to guarantee funding for such studies over the time period required. Prospective studies that lose funding and later become retrospective studies inevitably involve gaps in measurement which severely compromise research on questions of the relationships among variables in developmental sequence.

We know that composite measures of family management and family communication in early childhood predict subsequent drug abuse and that early conduct disorders predict subsequent drug abuse. But how are family management and early conduct disorders related? To what extent do conduct disorders reflect constitutional differences among children who are not amenable to intervention and to what extent do they reflect poor family management practices, inconsistent disciplining, or low levels of communication between parents and children? Only longitudinal studies with frequent data collection points can answer such questions.

The pressing research questions for family factors are how and at what developmental stage to target interventions. Family-focused prevention experiments appear warranted.

With regard to peer influences, more etiological study on the evolution of peer associations and peer influence prior to adolescence is needed. It is not clear from the literature how elementary school peer influences and interactions affect subsequent peer interactions and drug abuse. It is possible from the data to hypothesize a social skills deficit model in which young children are rejected by teachers and other children for either aggressive, shy, or other antisocial behaviors indicating a lack of skills to interact with others (cf., Asher et al 1980; Ladd and Mise 1982; Richard and Dodge 1982). An alternative hypothesis which is also consistent with the existing data is that young aggressive children begin to associate with each other early on in deviance-prone peer groups (Ladd 1983). Both hypotheses may be supported. With regard to adolescent peer associations. while we know that drug users associate with drug using peers, we do not know much about the degree of attachment in these relationships. Kandel has suggested that there are differences between the peer

associations which encourage marijuana initiation and the peer involvements of youngsters who have moved beyond marijuana experimentation into the use of other illegal drugs. We need to know more about these differences, especially with regard to the degree of role modeling, respect and emulation found in interactions in the latter group.

With regard to schooling, the point at which school performance becomes important as a correlate of drug abuse is unclear. First-grade readiness is not a predictor, but by adolescence, both early drug use initiators and drug abusers are children who are not performing up to their ability level in school. How is academic performance during elementary school related to subsequent drug abuse? Spivack's (1983) research suggests a complex developmental set of interactions between early socialization, school performance, and later antisocial behavior. How do such processes work in the etiology of drug use and abuse?

Competing models or theories of adolescent substance use and abuse remain tenable in the absence of etiological studies which trace the developmental sequencing among the risk factors for drug initiation, experimentation and abuse. What appears to be needed at this point is prospective longitudinal research that includes measures of the most strongly supported risk factors repeated every year or two during childhood through at least the age of 15. This research should be cognizant of the existing theories of drug abuse which have attempted to synthesize knowledge regarding drug abuse risk factors. Measurement points should be timed to allow assessment of the causal linkages implied in these developmental theories. Such research will provide further guidance regarding which of the myriad possible strategies for drug abuse prevention hold greatest promise. Equally importantly, this research will inform decisions regarding the developmental point at which interventions should be targeted.

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Correlates and Concepts: Are We Chasing Our Tails?

Milton F. Shore, Ph.D.

Tracing the roots of drug abuse in adolescence to very early experiences some 10 to 15 years prior to the drug behavior is an extremely complex and difficult task. Some researchers have indeed considered it futile, while others have suggested that if we are to develop an understanding of the etiology of drug abuse we need to be able to identify potential high-risk groups at very early ages. That means discovering those conditions which Influence potential drug use that have high predictability. However, before we look at some of the papers presented during this conference that try to describe some of the very early factors that are highly predictive of adolescent drug abuse, some general statements need to be made about the progress, both in theory and in research, that has taken place over the past decade in the drug use and abuse area. At least seven major advances have taken place:

1. There is increasing emphasis on a developmental framework withln which the needs and issues of various stages of development are related to drug use and abuse. We now discuss not only adolescence but unique preadolescent issues, problems of the school-age child, difficulties in preschool (some early identification of hyperactivity, for example), and there is even increasing interest in areas of infancy. This is important because interventions of any kind require knowledge of the unique developmental needs and the most appropriate arena for preventive intervention, whether family, classroom, peer group, or with other adults in the community.

2. The scope of study for the person in relation to drug use and abuse has also been broadened. We are not only focusing on the drug abuser as an individual, but relating the person who takes drugs to family forces, peers, and society in general. In this way, our framework is becoming more ecological.

3. Much is being gained by exploring multiple aspects of an individual's functioning rather than focusing narrowly on

overt behavior such as drug abuse and reports of such behavior. More work is being done on cognition and motivation. Unfortunately, there remain some major gaps in knowledge of the affective life of the individual and on unconscious, as well as conscious, wishes as related to drug behavior.

4. In the area of drug behavior we have begun to discriminate between the drug user and the drug abuser. We are asking about the ways in which they are different. We now also discriminate between drug dependency and drug abuse. We discriminate between kinds of drugs that are being used and abused. This permits us to see that sometimes the use of illicit drugs need not always result from psychopathology but can also be associated with experimental behaviors and risk taking behaviors related to individuation or other issues at given stages of development.

5. Greater interest has developed in prevention, as distinguished from approaches that are purely treatment oriented and/or legal. We are looking to etioiogical research to guide our prevention efforts.

6. Attempts to prevent drug abuse have become increasingly sophisticated, moving beyond the simple provision of information about drugs and their effects. Efforts now attempt to address underlying factors that are presumed to be related to drug-taking behavior and place individuals at high risk for drug abuse. However, because findings from correlational and retrospective studies are often contradictory and often colored by a considerable number of developmental changes which have not been taken into account --plus other contaminating variables--applying generic findings from etioiogical research can present both conceptual and methodological hazards.

7. A greater understanding has developed regarding the relationship between the urgent national need to launch programs to prevent drug abuse and the research process. This conference is an example of efforts to draw implications for drug abuse prevention programs from etiologic research on drug use. As scientists, we are aware that we must both follow the leads that our data suggest while simultaneously sharing our information on a timely basis with the service community.

I now turn to the three papers related to early childhood factors and discuss them in the sequence in which they were presented: Baumrind, Bush and Iannotti, and Hawkins and his colleagues.

Dr. Baumrind's paper is based on her longitudinal study from the Family Socialization and Developmental Competence Project (FSP). She very sensitively and appropriately fits the use of drugs into a general understanding of the issues of adolescent growth and

development. For example, she relates drug use in some cases to risk taking and creativity which many of us who have worked with adolescents in settings such as alternative services (hotlines, runaway centers, etc.) have found to be correlated. One of the features of adolescent development certainly is taking risks as one way of individuating. Indeed, it is the risk taker who is able to represent some of the most important features of the developmental stage of adolescence--innovation, creativity, and the unique putting together of ideas.

As Baumrind points out, parts of risk taking may involve some drug activity. However, it is important to separate those who take risks and experiment with drugs--who are able to learn from the experience, regulate their behavior, and eventually give it up--from those in whom drug use does not stop with the risk taking process, and those for whom drug use is an escape or an effort to resolve severe psychological problems. In the latter, we have the severe cases of substance abuse based on an inability to control and regulate wishes and impulses (one can see this clinically in the number of times many of these young people talk about stopping but are unable to, as in the adult alcoholic). The problem is trying to identify those adolescents at risk of becoming invested in compulsive behavior before the individual has done harm to him or herself by virtue of becoming invested in uncontrollable acting out. Moveover, no markers have been identified by Baumrind, or anyone else, for clearly identifying those who will do harm to themselves as compared to those who will engage in some controllable form of risk-taking and then go on to other behaviors, a sequence Baumrind does discuss. Although one can argue that there is a need for research on variables that will identify individuals at an early age who are likely to do harm to themselves and their community so that interventions can be targeted to these youngsters, this begs the question as to what is rational policy in the interim with regard to those youngsters involved in nonimpulsive drug-taking behaviors. Moreover, these may not be wholly separable phenomena (impulsive as compared to normative risk taking) and there may be a continuum extending between these two behaviors.

The identification by Dr. Baumrind of family atmospheres related to the development of self regulatory mechanisms of the child is also an important contribution. The delineation of the authoritative mode, as opposed to permissive and authoritarian mode, as an aid in the socialization of the child is certainly an interesting finding, consistent with some of the early work by Lewin (1936). who showed that democratic group atmospheres among children as compared with laissez faire and authoritarian atmospheres resulted in highly responsible behaviors. But one needs to ask the question: Why is it that within a given family atmosphere certain individuals eventually abuse drugs while others do not? What are the differences in the ways the general family atmosphere gets translated into specific behaviors between parents and child? What are the individual characteristics of the child that lead to drug abuse behavior, while their siblings

might not have become Involved with drugs, although exposed to the same general family atmosphere? How can we translate the general atmosphere into the specific characteristics of individuals and those processes that need to be developed to judge, understand, and control behavior?

In addition, Dr. Baumrind presents a large number of correlations found at different ages. On purely statistical grounds with this large number of correlations, some are bound to be spurious. Even so, as Dr. Baumrind has pointed out, the meaning of some of the data is unclear and even contradictory. Sex differences certainly need to be recognized. The findings that suggest that at one age one finds certain activities related to drug abuse, while in another an opposite finding is found, shows us the need for a conceptual model that cuts across developmental stages and makes some sense of the various changes as we go through the life cycle.

One finding cutting across age is the consistency of the relationship of family disruption to drug abuse. However, we need to be careful in dealing with large samples. One may get significance in large samples, yet only explain a small amount of the variance. We need to know how family disruption is translated into specific mechanisms, and what conscious and unconscious motives drive the individual toward substance abuse.

Arguments about "stages" and the meaning of "stages" in drug abuse seem to be mostly academic. A great deal depends on how one defines the term "stage." Just because something occurs prior to something else in a temporal sequence does not make It a stage. Stages of development have conceptually involved a restructuring and reorganization. One may talk about temporal sequences, but even then temporal sequences have to be looked at cautiously in terms of their predictability and the reasons for them. Could these sequences only be explained by availability of only certain kinds of drugs? One thing seems clear: early entrance into illicit drug use is predictive of later, more severe, drug use, as discussed by Robins and Przybeck (this volume). Thus, we seem to be able to feel confident enough so we can accept early drug users as a high-risk group. But this seems to be so with many disturbances--the earlier in the developmental sequence that we see almost any pathological characteristics, the more severe the disturbance and the poorer the prognosis.

One also needs to be careful about generalizing from Dr. Baumrind's sample. Her white, middle class, Berkeley population can give us some hints. Are the factors the same in a population that might be lower class, black, and poor? What Dr. Baumrind's flndlngs do highlight are the complexities of research In this area, particularly research in which we are trying to predict from very early experiences over time. One wishes that she had included many more measures, especially of conscious and unconscious behavior. The focus on moral development, although fashionable, I feel has very limited significance. The issues

regarding moral development, as currently considered, are strongly tied to social and cultural characteristics based on a value system associated with our particular contemporary political climate which says that any drug use is bad. On the other hand, we need to be very sensitive to her statements that the more socially mature and competent adolescent may, indeed, try marijuana and that the most intelligent adolescents may be either experimenters or "rational abstainers."

Dr. Baumrind's comments at the end of her paper about the handling of difficult behaviors in adolescents need to be taken very seriously. We do not want to be hampered in our efforts to explore those areas that are helpful for adolescent growth. We thus must avoid both the punitive and the simplistic answers that currently permeate our culture. We need to look beyond the general data to very specific individuals, whose needs necessitate specific programs to reach and serve them, and to make a range of programs available for those who are using drugs for many different reasons.

Drs. Bush and Iannottl have reviewed the various theories related to children's understanding of health and illness. They have clearly outlined the advantages and disadvantages of these approaches, and the areas they can and cannot explain. However, as we begin to tie drug abuse in with health promoting behaviors, we begin to see how all of these are then related to self-esteem and the complex interrelationships of other parts of personality functioning. One question that arises, for example, is how do certain children, particularly those with chronic illnesses who need drugs, deal with illicit drugs? How do they develop an understanding of when certain drugs are appropriate and other drugs inappropriate? Are they at high risk for drug abuse because they have been introduced to the need for drugs earlier in their lives?

One of the important statements that Bush and Iannotti make is that "different conceptual systems appear to be appropriate for different stages of development." This is extremely important in attempting to understand health promoting behavior. Unfortunately and frequently, efforts are made to use the same conceptual model for all situations and age groups. Realizing that under certain circumstances one model may be more appropriate than another is very important. The question is, what are these circumstances? Indeed, how does one develop a respect for one's body and its functioning throughout early childhood and early adolescence? Longitudinal work following individuals from early ages along the dimensions of health orientations, behaviors, and attitudes will be able to give us insight into where we should be going and how some of these theories interact. For example, at what point in development are drugs perceived as having negative effects on the body and when does one resist the pressures of current advertising? When does the use of drugs become exploratory risk taking, if such is the case?

The Bush and Iannotti paper asks many questions. We need to answer the questions they raise in order to build bridges between health orientation. appropriate drug use, and illicit drug abuse. The use of indepth, subtle measurement techniques over an extended period of time with measures broad enough not only to deal with cognitive and behavioral areas but also with conscious and unconscious affective areas related to the evolution of the self at various developmental stages and in various environmental settings will give us insight into why multidetermined drug abuse might be likely in a particular adolescent.

Dr. Hawkins and his colleagues have done a truly remarkable job in reviewing the literature on the childhood predicters that are correlated with adolescent substance abuse. They begin with an excellent framework in which the problems in doing research on prevention are identified. They are able to set the arena for understanding the types of variables involving school, families, and peers. As one goes through the material, not unexpectedly one sees that the highest correlations are between predelinquent behaviors and illicit drug use. There certainly seems to be a relationship between the handling of aggression in children, the development of antisocial behavior, and subsequent drug problems. But one is struck in reading this paper by the tremendous wealth of correlations with the inability to gain any organized conceptual answer. One would expect that the identification of correlations should logically lead to the development of greater conceptualization. In fact, the problem may reside in the lack of information regarding the intricate processes that link these correlated attributes within a conceptual whole. This review is very complete, but what we may be seeing in the correlations is a great deal of redundancy, of using different labels to describe like or similar phenomenon. One way to gain meaning is to subsample these various large groups to explore what is really going on and what the variables represent.

Little doubt seems to exist about the relationship between a prosocial emphasis (usually called socialization), antisocial behavior, and drug abuse, but many of the factors identified in correlations do not necessarily lead to drug abuse. Although low self-esteem, academic failure, family problems in early life, and poor interpersonal skills are correlated, these factors lead to a number of other pathological conditions. In order to reconcile some of the conflicting and contradictory data, the use of small samples and of special techniques becomes essential to bring us an understanding of what is happening. Although the authors talk about a prosocial emphasis, how does one internalize a social conscience? How does one develop in early life the mechanisms that form the foundation for dealing with aggression? What is the relationship between certain physiological mechanisms and behavioral controls? What are the antecedents of an adequate self-esteem? In other words, how do the factors relate on a process level? What are some of the preconditions for an individual's being able to deal with various kinds of

environmental stresses? What is the interweaving of individual variables and environmental variables? By asking such questions, we can begin to look more deeply into the situation. We end up less with a mere listing of variables that are related to other variables with little understanding of what the meanings are, and more with an effort to integrate and organize the material that we have. Clearly, we are interested in early intervention and need to look at early family and school variables; but longitudinal studies, such as Baumrlnd's. in which we watch very carefully along different dimensions, will help give us answers to some of these questions.

One aspect of adolescent development is missing in all three papers. The authors of each paper focus a great deal on peer groups in adolescence and forget, I feel, the role of close contacts with adults outside of the family and the meaning of this contact with other adults to the adolescent. Many of the peer group pressures, and even the development of a youth culture, can be seen as resulting from the abdication of responsiblity by adults in our society. Thus, the peer groups may be substitutes for the failure of adults to make adequate contacts with adolescents and work with them in such a way as to build their self-image and reduce their antisocial behavior. One such avenue is the world of work. The absence of any carefully organized meaningful employment programs for adolescents in our society, from my research, negatively affects self-esteem of young people, leads to close peer attachments, and fosters open rebellion toward the adult world.

What do all these papers tell us about where we ought to go in our work on early factors related to the etiology of drug abuse behavior? In regard to theory, clearly developing a theory of prevention and doing prevention research are extremely difficult. Theoretical complexities in prevention research are much greater than in treatment research. There are a large number of assumptions as well as vast numbers of contaminating variables. We need to put our theories together and broaden our understanding to include studies which would deal with many levels: microlevels as well as wide macrolevels. Different levels of individual functioning also need to be analyzed. Massimo and Shore (1963). for example, in their work on adolescent delinquency, studied three levels of individual functioning: from the overt level, to cognitive functioning, to personality variables related to these. By interrelating levels, Shore et al. (1966) were able to understand the nature of change and the relationship between socialization and learning. Only if we study intensely some individuals selected by clearly defined criteria over a period of time will we be able to determine how behavioral regulation mechanisms develop in early life and how these may be related to later behaviors. We will also be able to see what may cause breakdowns in these regulation mechanisms at different developmental stages and when certain kinds of risk taking behaviors are casual while others are highly symptomatic. We certainly need to identify the problem areas which signal

future difficulties and see if we can identify them very early. for example, are the handling of high anxiety, early depression, tension. peer pressure, and the boundaries between self and the outside world related in any way to substance abuse? Seeking the answers to these questions requires a major effort at the integration of biological, experiential, and societal factors on many levels over an extended time period.

A major challenge in the study of the etiology and prevention of drug abuse lies in the area of research methodology. Large-scale studies can direct us to look at certain kinds of specific areas (for instance, the general age of onset, temporal sequences). They can suggest many hypotheses. They can help determine individuals of possible high risk. We need to sub-sample our large studies, look at these various samples, and develop measurements that give us a greater understanding at different levels of the phenomena. We currently are making some very large leaps from our data and finding contradictory results. These conclusions can only be tested by more indepth studies of small samples. For these indepth studies we need to develop new instruments which have greater sensitivity and tap attributes not previously measured. We are currently using questionnaire data and correlating traits without other means of validating reports or obtaining intrapsychic, interpersonal, or developmental data on the subjects. We must have subtle measures with methodologies that tap different levels of behavior and factors underlying these behaviors.

A major need also exists for intervention research tied to some of the ideas that have been developed from current work on possible precursors of subsequent drug abuse. This intervention research should be closely tied to developmental personality theory and to variables related to change and not be tied to some of the recent models and methodology that are being used which are mechanistic and add little to our knowledge. The measurements that are developed should be useful in helping us develop the capacity to reflect on theoretical issues. For example, in the Massimo and Shore studies mentioned previously, the findings gave us some understanding of the issues of socialization, guilt, verbalization, and development of the sense of time in successfully treated chronic adolescent delinquents.

Continuing to encourage longitudinal research is essential. This means taking repeated measurements at different stages of development and studying the interrelationship of these measures. It means developing unique tasks for testing for multiple measurements and to assess changes over time with respect to the same attributes. It means identifying certain high risk groups and selecting from each of them individuals to be followed over a wide age range. We now have statistical techniques that can be used for longitudinal studies. Intensive studies of individual cases and path analyses can help us study sequential changes. In these ways, we will be able to gain greater meaning from our data.

To summarize, in order to study prevention, the etiology of drug abuse in adolescence, and the possible relationship between early precursors and later behaviors adequately, we need to understand the processes and mechanisms through which certain behaviors occur, under what circumstances they are elicited, and how they can be changed. By increasing our knowledge base around how people function more broadly, we will be able to determine how people learn, how they handle stress, how they change over time, how they grow from successful intervention, and how they become productive, responsible, happy human beings without needing to resort to the inappropriate use of drugs.

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Research Strategies to Identify Developmental Vulnerabilities for Drug Abuse

Stanley I. Greenspan, M.D.

In approaching questions regarding the etiology of drug abuse and its prevention, I have been impressed by the similarities and parallels between clinical work with persons using, abusing, and addicted to drugs and clinical research with lnfants at risk for developing psychopathology. Many of the points have been touched upon in the papers by Baumrind, Bush and Iannotti, and Hawkins and his associates, but only in terms of childhood and adolescent manifestations, such as poor impulse control, antisocial behavior, poor school performance, and impaired human relationships. These behaviors were defined as precursory indicators of future drug use. Interventions were outlined to prevent further movement along the path toward drug use without due regard for predisposing underlying psychopathology or developmental vulnerabilities. Dr. Shore discussed the need to learn more about these rlsk factors and the processes and meaning of the variables found to be correlated with substance abuse. My discussion will focus on the theoretical perspectives of the development of psychopathology and preventive intervention in infancy with regard to predisposing risk factors for drug abuse.

I will first present an approach to etiologic and intervention research and then illustrate some of the links between infancy and subsequent behaviors associated with drug use. Vignettes wlll be used to illustrate how early intersensory integration, self-regulatory mechanisms, and affective development relate to subsequent processes and affective relationships which appear to be Impaired in individuals prone to acting out and antisocial behaviors and use of substances to "feel good about oneself," whether from a somatic, affective, or interpersonal stance.

In discussing research on the etiology of drug abuse, we first need to consider where we are coming from in terms of how we ask our questions. We come from different research traditions, clinical and descriptive, and we need to integrate and apply a systematic approach to this body of research. The systematic approach I propose illustrates the approaches used in our own clinical research with infants and their families (Greenspan 1981; Greenspan and Lieberman 1980; Greenspan and Porges 1984).

THEORETICAL PERSPECTIVES ON APPROACHES TO ETIOLOGIC RESEARCH

Mental health and substance abuse research is, in part, struggling with an appropriate scientific identity. One behavioral science tradition has focused on studying functional relationships between predefined groups of measurable variables. The value of this approach is that one knows in advance one will clearly get a result. The functional relationship will or will not be demonstrated. As is well known, however, what is measurable may not always be meaningful and what is meaningful may not always be measurable. Therefore, the danger in this approach is that it either avoids areas of relevance to clinical practice or may study some problems in an oversimplified or even misleading manner, as indicated in Dr. Shore's comments.

The clinical descriptive and psychodynamic tradition, in contrast, begins not with preconceived notions of relevant or measurable variables but seeks to describe complex, naturally occurring phenomena. Then, through a series of gradual approximations, it attempts to abstract meaningful patterns, classify these patterns, and describe their vicissitudes under natural and other conditions (e.g., intervention conditions). While a special asset of this approach is the opportunity it affords to discover phenomena relevant to challenging clinical problems (e.g., discovering and classifying new syndromes). it also has an Important limitation. One is betting on the ingenuity of the Investigator to describe the phenomena and recognize the patterns. There is no guarantee that useful descriptions, abstractions, patterns, and subsequent classifications will occur.

Both approaches are obviously necessary to study complex mental health and substance abuse problems. These approaches may be integrated through the following sequence:

- Describe the complex, natural, clinically relevant phenomena;
- Abstract relevant patterns (e.g., identify the relevant variables);
- Develop useful classification systems (e.g., further codification, definition, and grouping of the relevant variables);
- Develop instruments and protocols to recognize, measure, or quantify the relevant variables and dynamics referred to above (Note: One should not avoid the challenge by developing instruments to measure factors less significant and relevant because they are "easier" to develop and validate.);
- Describe variations in these classified patterns under natural and special (e.g., intervention) conditions;
- Develop new "special conditions" (e.g., interventions) at a

descriptive level that, on a case-by-case basis, appear to shift patterns toward more optimal configurations;

- Study the functional relationships between these new clinically relevant, predefined, measurable variables. (For example, studies would include such functional relationships as those between etlological variables and syndromes, treatment approaches and outcomes, and interrelationships among pathologic and adaptive patterns at biological, behavioral, experiential, and environmental levels).

The exploration of these functional relationships divides into two components:

1. Basic research, which looks at relationships among

   a) Etiological variables and syndromes;

   b) Antecedent developmental patterns and disordered functioning;

   c) Mechanisms responsible for disordered functioning at biological, behavioral, and experiential levels;

   d) Mechanisms responsible for adaptive functioning at biological, behavioral, and experiential levels; and

   e) Approaches with and mechanisms of action of varios therapeutic agents for improving adaptive functioning and reversing pathologic trends.

2. Applied treatment and/or preventive intervention research (e.g., clinical trials), which looks at relationships among:

   a) Defined interventions and clinically valid outcomes;

   b) No intervention or hypothesized "less optimal" interventions and outcomes;

   c) Intervention "process" steps--one of the most frequently ignored aspects in studies which focus on outcome measures--and outcomes; and

   d) Developmental level of an individual's personality, diagnosis, "process" steps achieved in an intervention program, and outcome.

As we approached the area of mental health problems in infancy and early childhood some 10 years ago, we were influenced by this framework. We first had to ask where within these steps we were in our knowledge of clinical approaches to diagnosis, prevention, and treatment (and I raise this question here with regard tc etiologic research on drug abuse). Did we have sufficient knowledge of the way in which patterns were organized, and

therefore could be classified and measured, in order to study functional relationships, or did we need to start at a descriptive level, immerse ourselves in complex clinical phenomena, and bet that the clinical researcher's "green thumb" would lead to the extraction of meaningful patterns and techniques and the development of new methods?

In the Clinical Infant Development Program we were influenced by what we felt to be premature attempts to narrow the field of observation in work with infants and families. There were programs, for example, that intervened or that measured outcomes but looked at only one dimension of development. Sensorimotor or cognitive development, or aspects of social adaptation were the focus, and investigators ignored indepth emotional and psychological features of development, as well as family functioning--aspects brought out in the papers presented at this conference by Baumrind, Bush and Iannotti, and Hawkins et al. This is not unlike the situation today in drug research when etiologic research categorically focuses on psychopathology (especially antisocial and deviant behavior, depression, anxiety, and hyperactivity), or family influences (modeling, disruption in the family, disciplinary techniques, etc.), peer influences, social pressures, or other specific environmental variables.

Such a categorical approach ignores the multidimensional aspects of etiology and the confluence of multiple determinants, e.g., conscious and unconscious, genetic, adaptational, structural, and dynamic. In our own work, we reasoned that if the areas of development most sensitive to preventive intervention concerned the formation of human relationships and the development of affective coping strategies, then assessments which looked only at cognition or limited aspects of social adaptatlon might be like the proverbial drunk looking under the street light for his wallet when he left it in the dark across the street.

We were also struck by the fact that many programs grouped participants, both infants and families, into pseudohomogeneous groups based on somewhat undifferentiated criteria. Parents and children might be grouped according to educational and economic status or other demographic variables with little attention given to their clinical condition (i.e.. the presence or absence of psychopathology), even though clinical status often accounts for much of the variance in most areas of human functioning. In fact, in many programs, there have been no systematic ratings of individuals, family functioning, or typological assessment of problems other than the target behaviors.

Even more compelling were the observations that "high" risk families often had multiple risk factors, had children who evidenced impaired functioning quite early in life, and that the parents themselves came from multiproblem families, which suggests an intergenerational pattern of unknown cause or dynamic.

THE DEVELOPMENTAL STRUCTURALIST APPROACH TO ETIOLOGIC RESEARCH

Our approach to clinical research accepted the assumption that human development involves multiple, interrelated lines of development. Included are physical and neurological growth, cognitive or intellectual development, the development of human relationships, and the capacity to organize and differentiate experience (coping and adaptive capacities) (Greenspan 1981).

This integrated approach to the classification of adaptive and pathologic personality organization and behaviors in infancy and early childhood is based on a developmental structuralist framework (Greenspan 1979. 1981) which complements the traditional symptom cluster or etiologic approaches to the classification of psychopathology. This integrated developmental theory attempts to reconcile our knowledge of development based on "emotional experiences," including the presumed internalization and differentiation of experience based on human relationships, cognition, and emerging empirical research on neurophysiological, behavioral, and social development of infants and young children. The approach focuses on the organizational level of personality along multiple dimensions and on the mediating processes of "structures." This approach permits focus on the person's individual way of processing, organizing, integrating, and differentiating the multiple dimensions of experience, that is, the pathways that lead to certain behavioral outcomes. This "final common pathway" connects the influence of multiple etiologic factors with varying outcomes and suggests something fundamental about the person's manner of organizing its experience of its world, internal and external, animate and inanimate: At each developmental stage, the characteristics which define the experiential organization may be viewed as a structure.

Two additional assumptions underlie this approach: 1) that the capacity to organize experience is present very early in life and progresses to higher levels as the individual matures; and 2) that phase-specific higher levels imply an ability to organize in stable patterns an ever widening and complex range of experience. The organizational levels of experience may be delineated along a number of parameters: age or phase appropriateness; range and depth (animate and inanimate, full range of affects and themes); stability (i.e., response to stress); and personal uniqueness.

Certain characteristics define the experiential organization capacity at each stage, and age-expectable themes appear which are characterized by their complexity, richness, depth, and content, such as the dyadic relationship between an infant and mother and the later triadic and posttriadic relationships which grow to include father, siblings, peers, and others. The degree to which the individual experiences the full range of stage- and age-appropriate experiences in stable, stress-resilient personal configurations may be viewed as an indicator of involvement in a particular stage of development and readiness to progress into

the next developmental stage. Developing optimally adaptive structures at each stage facilitates further development.

This approach is unique in that it alerts the clinician or investigator to look not only for what the infant or child is evidencing in his or her behaviors (e.g., psychopathology) but for what the child is not evidencing. For example, an 8-month-old who is calm, alert, and enjoyable, but who has no capacity for discrimination or reciprocal social interchanges may be of vastly more concern than an irritable, negativistic, food-refusing, night-awakening, 8-month-old with age-appropriate capacities for differentiation and reciprocal social interchanges, a point analogous to that of Baumrind with regard to adolescent behaviors which are worrisome to adults but which are age-appropriate explorations of life style by the adolescent. In this approach, each stage of development may be characterized according to "expected" organizational characteristics. Specific symptoms or behaviors are not viewed in isolation but in the context of the overall phase-specific experiential organization expected or achieved. This concern for continuity and stability of either normal or disordered behaviors is enriched by the simultaneous focus on level of integration rather than specific symptoms or behaviors.

An overview of the developmental structuralist approach to stages of development is provided in table 1, a chart that summarizes the organizational tasks and adaptive and maladaptive infant and caregiver patterns at each level in the developmental structuralist framework. To this chart has been added a column which identifies attributes of each level which associate with precursory behaviors identified in the papers presented in this symposium.

IMPLICATIONS FOR THE ETIOLOGY OF DRUG ABUSE

In considering the developmental stages outlined in table 1, one should not think that failure at a stage in infancy or early childhood etiologically leads to a problem in adulthood. Rather, looking at the normal functions that are established in infancy and early childhood will help us understand what may happen when these normal functions are not established or are not sustained. Early "emotional milestones" are a window by which to understand complex issues contributing to the lack of attainment of important ego functions and may give clues to better understanding of adult disturbances that have some similar features (without implying a one-to-one correspondence).

In the first stage, homeostasis, the key issue is whether the baby establishes self-regulation and interest in the world as evidenced by the baby's being comfortable and relaxed and taking a multisensory interest in the world (including vision, hearing, touch, motion, vestibular functioning, etc.). Most babies progressively develop these capacities over the first 2 months of life. One may look at the sensory system and each modality in terms of whether it is hyper- or hyposensitive. One may look at

TABLE l: Developmental Basis for Psychopathology and Adaptation in Infancy and Early Childhood*

Stage-Specific Tasks and Capacities	Capacities	
	Adaptive	Maladaptive (Pathologic)
Homeostasis (O-3 mo)	Internal regulation (harmony) and balanced interest in world	Unregulated (hyper-excitable). withdrawn (apathetic)
Attachment (2-7 mo)	Rich, deep, multisensory emotional Investment in animate world (especially with primary caregivers)	Total lack of, or non-affective, shallow. impersonal involvement (e.g., autistic patterns)
Somatopsychologic differentiation (3-10 mo)	Flexible, wide-ranging. multisystem, contingent (reciprocal) affective interactions (especi-ally with caregivers)	Behavior and affects random and/or chaotic, or narrow. rigid, and stereotyped
Behavioral Organi-zation, Initiative. and Internalization (9-24 mo)	Complex, organized, assertive, Innovative, integrated behavioral and emotional patterns	Fragmented. stereotyped, and polarized behavlor and emotions (withdrawn, compliant, hyperagressive or disorganized toddler)
Representational Capacity, Differ-entiation. and Consolidation (18-48 mo)	Formatlon and elaboratlon of internal represen-tations (imagery) Organization and differ-entiation of imagery pertaining to self and nonself; emergence of cognitive insight Stabilization of mood and gradual emergence of basic personality functions	No representational (symbol-ic) elaboration; behavior and affect concrete, shallow, polzarized; sense of self and "other" frag-mented, undifferentiated or narrow and rigid: reality testing, impulse regulation. mood stabili-zation compromised or vulnerable (e.g., borderline psychotic and severe character problems)
Capacity for limited extended represent-ational systems and multiple extended representational systems (middle childhood through adolescence)	Ever increasing capacity and flexibility to con-serve and transform com-plex and organized repre-sentations of experience in the context of expan-ded relationship patterns and phase-expected developmental tasks	Derivative representational capacities limited or defective, as are latency and adolescent relation-ships and coping capacities (e.g., regres-sion, acting out)

* Adapted from Greenspan 1981.

TABLE 1 (Continued)

Environment (Caregiver)		Risk Factors for Drug Abuse
Adaptive	Maladaptive	Developmental Vulnerabilitles Precursor Behaviors
Invested, dedicated, protective, comforting. predictable, engaging and interesting	Unavailable, chaotic, dangerous, abusive, hypo- or hyper-stimulating, dull	Impaired self-regulatory mechanisms; poor impulse control; conduct disorders; hyperactivity
In love and woos infant to "fall in love;" affective, multimodal, pleasurable, affective involvement	Emotionally distant, aloof, and/or impersonal (highly ambivalent); rigid	Compromised capacity/inability to oevelop attachments and human relationshlps; asocial or antisocial behavior; poor/ no attachments to others
Reads and responds contingently to infant's communications across multiple sensory and affective systems	Ignores or misreads (e.g., projection) infant's communication (overly intrusive, preoccupied, or depressed)	Affects, behaviors inappropriate; impaired reciprocity with other persons; attention deficits; impulsive, disruptlve behavior; social isolate
Admiring of child's initiative and autonomy, yet available; tolerant and firm; follows child's lead, helps child organize diverse behavioral and affective elements	Overly intrusive, controlling; fragmented, fearful (especially of toddler's autonomy); abruptly and prematurely "separates" from child	Inability to read emotional. behavioral cues of self and others; inabillty to use affect as a signal; poor integration, internalization of experience; poor/no comprehension of cause/effect relationships; poor self concept; extreme behaviors
Emotionally available to phase-appropriate regressions and dependency needs; reads, responds to, encourages symbolic elaboration across emotional and behavioral domains (e.g., love, pleasure, assertion) while fostering gradual reality orientation and internalization of limits	Fears/denies phase-appropriate needs; engages child in concrete (nonsymbolic) modes or only in certain realms (e.g., pleasure) and/or misreads or responds noncontingently or nonrealistically to emerging communications (undermines reallty orientation); overly permissive or punitive	Affect and behavior concrete, shallow, polarized; few/no representational (symbolic) constructs; limited symbolization of affect; sense of self/other fragmented: poor/ no reality testing; mood swings; severe character problems; lacks insight, reasoning ability; few/no internal controls and responds poorly to external controls
Supports complex, age- and phase-appropriate experiential and interpersonal development (from dyad to triangular and post-triangular patterns)	Conflicted over child's age-appropriate propensities (competitiveness. pleasure, growing competence, assertiveness, self-sufficiency, sexuality); aloof or maintains symbiotic tie; withdraws or overengages in competitive or pleasurable strivings	Severe character constrictions in one or more areas; excessive use of denial; regressive behaviors; inflexible; limited emotional resources; inability to cope with stress; circumscribed conflicts and character problems; reasoning ability is limited to immediate situation and tends to be concrete

the ability of the baby to use his or her senses simultaneously to regulate on the one hand and take a multisensory interest in the world on the other. This ability is evidenced in the 1-month-old baby in a calm, alert state who is looking and listening to his caregiver. Babies are worrisome who either start off in life unable to relax and focus or, during the first 2 months, evidence deterioration in their ability to calm and use their senses to process information, i.e., take an interest in the world.

What are the implications of faulty formation of these capacities in the child or adult? These are basic regulatory capacities, including the ability to process stimulus input and organize the stimuli without shutting down or becoming hypo- or hyper-reactive. These capacities relate to such predisposing risk factors for drug abuse as poor impulse control, conduct disorders, hyperactivity and impaired self-regulatory mechanisms. In many persons basic regulatory capacities are not well established. For example, the child with severe attentional difficulties cannot process information well. Some children who have only mild attentional difficulties, which are labeled attentional deficit disorders. actually have problems more in one sensory mode than in another. Some are more distracted by sounds or visual stimuli; others have tactile defensiveness, a pattern which is not well described in the psychiatric literature.

Sensory processing difficulties may also involve problems in making discriminations. In addition to a sensory system being hypo- or hyperarousable, we have observed infants in the first few months of life who seem unable to "tune in" to the environment. When mother talks to them, instead of decoding her rhythmic sound and brightening as most infants do, they look almost confused. Clinically, we have observed that this is present in some children with regard to one sensory pathway, but not another. For example, an infant with intact hearing, but unable to focus to rhythmic sound, may be able to focus on facial gesturing. When an infant is confused by vocal stimuli, we may coach a mother to slow down, talk very distinctly, not introduce too much novelty too quickly (most infants love novelty), use animated facial expressions and movement (to encourage use of vision) and tactile sensations. Often the infant will begin alerting, brightening, and become engaged. What happened to deaf children before they were diagnosed early in infancy is instructive. Such children by age 2 often looked autistic and were functionally retarded. The early diagnosis of deafness led to the introduction of sensory input through the intact modes (visual, tactile, olfactory, etc.). With these compensatory experiences, deaf children developed well cognitively and emotionally.

In the theory based on our observations, there is a sequence of psychological stages from interest in the world to forming a human attachment, to cause and effect interactions, to engaging in complex organized behavioral and affective patterns, to constructing and differentiating representations. No single

sensory pathway appears critical, however. For example, auditory input is not required to construct symbols. Symbols can be constructed from visual and tactile input. What has tended to happen, using deaf babies as an example, is that the mother, not knowing her infant can not hear, becomes anxious if she can not get a brightening response from her new infant. She talks even more. and even louder and faster. Becoming discouraged, she becomes so anxious that she rigidly and repetitively tries the same pattern. She does not experiment with other sensory modes. Mother, in this example, overwhelms her infant who becomes more and more confused. Within this behavioral context the old descriptions of autistic children are not surprising. The children were not in severely disturbed families but often in professionally successful families and the parents exhibited obsessive compulsive patterns. (Having parents with obsessive compulsive traits has also been identified as a risk for adolescent drug abuse (Brook et al. 1983). Infants with hypersensltlvltles or discrimination difficulties may do worse with an anxious, intrusive, overwhelming stimulus world. On the other hand, the youngster who is hyporeactive, who needs to be "revved up." may do very well with a highly energetic caregiver. Fit is always a factor, but is amenable to intervention based on profiling individual sensory processing differences in the child and counselling to improve the flexibility or intuitive patterns of the parent.

The next stage, attachment, occurs between 2 and 4 months when we see a preferential emotional interest in the human world. This emotional interest builds on the sensory interest in the world. The world first must be experienced as regulated, comfortable, and interesting and pleasurable because of its affective components. If the early experience of the world is aversive, the affective interest in the human world may also be compromised. A total failure of the attachment process is seen in autistic patterns, in certain types of withdrawn and regressed schizophrenics, and intermittently in children who are dlagnosed as having pervasive developmental disturbances. We also see shallow attachments. There is some involvement with the human world but without positive affect or emotional depth. We see a compromise in the depth of human "connectedness" in some of the narcissistic character disorders, Illustrating a subtle deficit in the range of emotion incorporated into an attachment pattern. A severe lack of regard for human relationships is seen in the sociopathic or antisocial personality disturbance. While some individuals are involved in sociopathic behavior because of neurotic conflicts or anxiety (i.e., acting out), in the primary sociopathic disturbances, there is a failure to see the human world as human. Human beings are seen as concrete objects, only as a means to concrete gratifications. Attachment disorders have a potentially very wide range of consequences. To learn more about persons who abuse drugs and persons with histories of violent crimes to other persons (i.e., total disregard of other humans as human), one needs to observe the degree to which children with compromised attachment patterns are at risk and, if

so, what the consequences are of various levels of impairment in forming attachments to persons and society in general. Perhaps a higher percentage of persons with compromised attachment patterns have had multiple foster care placements, disturbed and withdrawn parents, or unusual constitutional tendencies which interfered with the formation of warm relationships and may exhibit higher risk for drug abuse.

In the next stage, somatopsychological differentiation, (4 to 8 months). cause and effect interactions predominate and involve all the senses. Sensory experiences become differentiated. Affective proclivities now emerge in "cause and effect" contexts and become differentiated. For example, exuberance and subtle affective signaling are expressed through both vocalizations and facial gesturing.

Early in the stage of somatopsychological differentiation, an infant seems to be capable of almost the full range of human emotional expressions. It is hard to think that a 4-month-old or 8-month-old has all the "moves," so to speak--it is clearer by 12-13 months--but if one divides the emotional terrain into its parts, one can see the full range of emotions. In terms of dependency, the 8-month-old can make overtures to be cuddled and held. He shows his pleasure with beatific smiles, and love of touching (if he does not have a tactile sensitivity). and puts everything in sight in his mouth, using his mouth as an organ of exploration. Unquestionably, curiosity, assertiveness, anger, and protest are present. The 8-month-old is already reaching, exploring and banging objects, learning about having impact and about cause and effect. Try to take a favorite food away from an a-month-old who does not want to give it up and he may throw the food on the floor in a deliberate, intentional manner, and look at you as if to say, "What are you going to do now?"

While empathy and consistent love will emerge later, one sees at this age affective-thematic proclivities. What determines whether these affective inclinations develop and become differentiated from each other or remain undifferentiated (so that eventually pleasure, dependency, and aggression cannot be experienced as separate from one another)? During the 4-8 month phase, the differential reciprocal signaling of the caregiver tells the child that pleasure is different from pain, hunger for food different from hunger to be picked up, assertiveness different from aggressiveness, and so forth. If each of the infant's feelings and expressions receives a different empathetic and overt response from the caregiver, the child experiences each of his own inclinations. Bruch (1973) anticipated what we now observe directly when she suggested that in some of the primary eating disturbances the dyadic signal system was not well formed because caregivers were rigid and unresponsive to the child's communications. For example, the child never learned to differentiate basic physical hunger from other sensations, such as dependency needs. In this regard, eating disorders may also prove to be associated with disorders associated with drug abuse.

During this stage, the affect system is differentiated to the degree to which the caregiving environment subtly reads the baby's emotional signals. Some infants do not experience reciprocity at all. Others experience selective limitations. Cause and effect feedback in one or another thematic or emotional areas is missing. No family is equally sensitive and responsive in all areas. Some families are conflicted around dependency, and others about aggression. Therefore, there will be more anxiety in some areas than in others. While this is, in part, what makes people different, when a whole area like dependency, pleasure, or exploration does not receive reciprocal, cause and effect feedback, early presymbolic (prerepresentational) differentiations may be limited.

This stage of development is also a first step in reality testing. At this time prerepresentational causality is established. The child learns that reaching out has consequences. The sense of one's own behavior and emotions having consequences is what causality is. Cause and effect experiences teach a child that the world is a lawful place, a point Baumrind has discussed (this volume). When cause and effect behavioral patterns do not occur, the most fundamental aspect of the sense of causality may be compromised. Later in development, ideas or representations are also organized according to the cause and effect patterns.

At the stage of somatopsychological differentlatlon, the fundamental deficit is in reality testing and basic causality. Subtle deficits may also be part of a lack of differentiation along a particular emotional-thematic proclivity. In various character disturbances and borderline conditions, we observe patients who are undifferentiated with regard to aggression but not dependency, or vice versa. Certain areas of internal life remain relatively undifferentiated yet, in other areas, differentiation and reality testing are very good. This uneven pattern is part of many definitions of borderline syndromes and may also relate to the disparity of patterns (achievements and deficits) found in drug-abusing populations.

In the next stage, behavioral organization, initiative, and Internalization (10-18 months) we observe sequences of emotion and behavior now orchestrated into complex, highly organized patterns. Consider an imaginative 17-month-old who walks up to father and places a box just behind him and gets him involved in a game in which father trips over the box. This is an example of very skillful, organized mischievous behavior. The toddler is also capable of taking mother by the hand, walking her into the playroom, pointing at the box where the toy is, and making different sounds until he gets the exact toy he wants. This sequence of five or six purposeful behaviors involves wish and intention orchestrated toward a specific goal.

As the child moves closer to 18 months, the ability to relate to the object world in a more functional way and see objects according to their functional properties emerges. Toddlers can

take a comb or toy telephone and use it purposefully. Although this is not yet imaginary play guided by mental representations or ideas, it is semi-realistic play with an understanding of the functional use of the object. Children can also understand the emotional proclivities of their parents in a functional sense. They sense either nurturing, warm, supportive, or undermining, controlling, intrusive patterns. One little girl was able to see her mother as a testing, envious person although she did not understand what her mother was saying. She would pull away from the mother whenever mother verbally teased her.

We speculate that the toddlers shift from an early stage (12-13 months). akin to ego-splitting in adults, to a stage of greater integration of different self-object organizations by 18-19 months. When I am involved in therapeutic play with a 12-month-old and that child becomes angry, I feel that if he had a gun, he would shoot me, a feeling akin to that when working with borderline adult patients. When you are the bad object, there is no simultaneous connection with you as the object of security and comfort. For that moment you are all bad. By the time a toddler is 18 months old, you may feel his anger, but you also sense that he sees you as an object of security, love, and dependency. You feel more as you would with a neurotic adult. There is anger, but the backdrop of security and relatedness is still there.

During this stage of behavioral organization, initiative, and internalization, we observe a progression from a type of ego-splitting, or part object relatedness, to a more cohesive sense of the functional and emotional proclivities of the object. Presumably, also, this integration is occurring in the sense of self. Just as toddlers are sensing their parents as loving or undermining, or both, they are also abstracting their own patterns of feelings and behaviors. They no longer see themselves as islands of discrete behaviors or feelings, aggressive one moment and pleasurable the next. These are higher level abstractions of feelings and behaviors, but still pre-representational patterns of the object and the self.

In part, one can think of the second year of life as involving the development of a conceptual attitude toward the world. What might be called a somatic attitude is evidenced in the first year because events are experienced somatically and physiologically and through sensorimotor and affect patterns. In the second year, the youngster abstracts larger patterns. Concept-building is occurring. The child understands the world in terms of its functions and can communicate and abstract across space (i.e., the distal modes). The ability to abstract time, organized in terms of the creation of representational memory organizations of the self and object, will only come in the representational phase of development which follows.

What are the implications at this stage for psychopathology and risk of drug use? Problems in the early integration of the "functional" self relate to syndromes in which there is

ego-splitting or a lack of a cohesive sense of self or a lack of an ability to abstract the range of emotional properties of self and others. The tendency to remain "concrete" rather than develop a conceptual and eventually a representational self-object organization is also related to limitations at this stage of development. For example, a person speaks in terms of discrete behavioral patterns ("I hit her." "He hit me." "I went out drinking."). Life is a series of interrelated but somewhat discrete behaviors. There is no sense of, "She is a frustrating person; therefore, I get upset," or "I go out drinking because I can't tolerate the pain and anguish of her frustrating me," or "She's a sweet person who loves me but I get scared of the closeness and therefore I can't handle it and I go out and drink." Often, in therapy, we inadvertently supply the missing representational level. The patient says, "I hit her." We say, "You must have felt angry." The fact is that the patient's problem is that he or she does not have the capacity for representational labeling of affect states. The person only feels the tendency to hit and not the feeling of anger in a representational mode. For many with severe character disorders and borderline conditions, life is a series of discrete behavior patterns. In normal development, as early as 18-19 months, a more conceptual attitude toward the world is developed, but many persons do not develop this capacity in the emotional spheres of their lives. They have it intellectually--they can do math and other abstract impersonal problems--but emotionally they are unable to operate at the 18-19-month-old level, or they may operate at different developmental levels with different emotions, e.g., pleasure and dependency at one level, and assertion and anger at another, depending on their caregiving environment.

Two extremes are observed. In one extreme, the capacity for organizing behavior and emotions and developing a conceptual stance toward the world is not formed at all. We also see fragmented images of the self and the object world. These individuals can relate to others but are at the mercy of moment-to-moment feelings. There is no integration of discrete experiences. for example, borderline patients have affect storms and keep shifting their behavioral and emotional inclinations. Their part self and object images are not tied together; they do not have a sense of themselves as operating individuals nor a sense of their significant others as operating individuals. Their part selves are fueled by unconnected drive-affect proclivities. Most of the severe character and borderline conditions (which are probably the most frequent conditions we treat today) have important normative parallels in the second year of life.

An internal signaling system also emerges in the second year of life. Affect, as a signal, seems to develop as part of a more general conceptual attitude toward the world. Toddlers, by 18-19 months, who do not get what they want, are not necessarily driven to temper tantrums or other "driven" behavioral patterns. They can pause and consider alternative behavioral patterns. They are also developing the capacity to read signals from other persons.

Nemiah (1977) has suggested that in certain psychosomatic conditions, such as drug abuse and impulse disorders, there is the lack of a signal affect capacity. Such persons can not elevate dysphoric affects into concepts and representational signals; instead they act impulsively or use drugs to mute feelings.

It is interesting to consider what helps the child develop a signal function. One component is the capacity to shift from proximal modes to distal modes of relating. An infant relates to the adult world with proximal modes, through being held and being touched. These modes are proximal in the sense that the infant is using his skin, a sense of pressure, and so forth. By 4 to 8 months of age, distal modes come into use. Vision and hearing are used in reciprocal signaling and the infant stays "in touch" with the feeling of direct touch by vision and hearing. By 12 to 18 months, the toddler, although across the room, can stay connected to mother or father through these distal modes. Vocalizations, visual signals, and affect gestures (a grin or smile) are used to remain in emotional contact. The refueling that Mahler (1975) discusses occurs not only through the proximal modes (coming back and hugging mother), but through the distal modes. The youngster, while playing, looks, sees mother's alert attentiveness, and feels reassured. Studies by Sorce and Emde (1981) on social referencing show that children are more exploratively confident when their mother is looking at them and taking an interest in their play, compared to when she is reading a newspaper in the same room. In other words, a child can explore, have the freedom of space, and still feel "connected." The child can relate across space, but can not yet relate across time. He does not yet possess this ideational or representational mode.

A child may not establish this distal communication capacity because his parent is overanxlous, overprotective, or overly symbiotic. Or the child may not have optimal use of his distal modes because of his own unique maturational pattern. Consider, for example, the child discussed earlier who has an auditory processing problem; he may not be able to decode mother's "that's a good boy." Or he may have a visual-spatial organizing limitation and have difficulty reading facial gestures or interpersonal distance. He may need to rely more on the proximal modes. He may have to be held to feel secure.

The use of distal modes may be an important key in the transition to the development of the ideational or representational mode. With the ideational or representational mode, one has mobility not only across space but across time because one can create ideas (one can conjure up the object).

Adults balance between proximal (wanting to be held and cuddled, in close physical contact with loved ones) and distal modes (enjoying warmth and security from the nodding and gesturing of a close friend in a good conversation). Adults who cannot receive experience through the distal modes often feel deprived and isolated. They often resort to proximal modes. This makes adult

life very difficult. This deficit has not yet been studied as a significant part of borderline disturbances, severe character disorders, or drug abuse, in each of which an inordinate sense of isolation, emptiness, and loneliness is characteristic. The development and transition from proximal to distal, then Ideational modes, creates flexibility in the ways the person can relate to his or her world. Failure at this stage can result in deficits in functional and conceptual aspects of self and object, and limitations in functional-conceptual, self-object, and affect-thematic proclivities.

Between 18 and 38 months of age, the representational capacity, differentiation, and consolidation stage, the child learns to create an internal world of ideas, symbols, and representations. The child uses his ability to abstract the functional properties of objects, abstracts the object's properties, and creates the object in his mind. Mental representations are not only visual Images but multisensory, emotional, and interactive images. Such images are dynamic and based on experience. If a 2 1/2-year-old thinks of his mother, the maternal image is of smell, touch, voice, actions, feelings, interactions, as well as past and present subjective experience. The ability to create one's own Ideas allows for mobility over both space and time. A child can manipulate his ideas and create different fantasies. Nightmares, pretend play (i.e., one doll feeding another doll), and functional language appear.

The representational world evolves simultaneously on two fronts: representational elaboration and representational differentiation. From 2 to 4-1/2 years, one observes single repetitive play (the doll drinking from a cup is played out repetitively) giving way to the grand epic drama (the doll drinks from the cup, goes to sleep, is awakened, spanked for spilling the milk, and then spanks the mommy doll back, and finally is loving and cuddling). One looks for this type of elaboration in terms of the emotional themes of life (e.g., the wish-affect-thematic proclivities such as dependency, pleasure, curiosity, assertiveness, aggression, protest, anger, self limit-setting, and by age 3-4, empathy and consistent love). By dividiing up human emotions into a number of thematic-affective areas, one can identify areas in which representational elaboration is or is not occurring.

If, for any reason, the child is not getting practice in the interpersonal emotional use of language and pretend play (i.e., elevating these proclivities to the ideational plane), we often see the beginnings of a deficit or constriction in representational capacity and a confinement to concrete patterns of thought. Deficits or constrictions may occur because mother or father becomes anxious in using "ideas" in emotionally relevant contexts (i.e., they are afraid of emotional fantasy, in general, or in specific thematic-affective areas such as separation, rejection, aggression, or assertiveness). Many adults are more frightened by the representation of a theme, such as sexuality or aggression, than the behaving or acting out of the same theme.

Parental anxiety often leads to overcontrolling, undermining, hyperstimulatlng, withdrawn, or concrete behavioral patterns (i.e., let's not talk, I'll feed you). Also, the child, because of unique constitutional-maturational patterns or early experiences, may become overly excited and therefore afraid of his own use of ideas and new feelings (e.g., sexual themes in play) and therefore may regress to concrete prerepresentatlonal patterns. If the parents cannot help the child return to the ideational level, the child can not practice his affective-thematic proclivities at the ideational mode, and the child remains at the behavioral action pattern mode ("acting out"). The ideational mode allows for "trial" action patterns in thought (to contemplate and choose among alternatives). One can reason with ideas better than one can with actual behaviors. Therefore one has an enormous deficit if a sensation, or series of sensations, that are distinctly human, do not have access to the "ideational" plane.

A parallel aspect of development which occurs simultaneously with representational elaboration is representational differentiation. Our observations suggest that the differentiation of those experiences that are part of the self and those that are part of the object world start as soon as representational elaboration starts--in the latter part of the second year of life. We do not believe that there is a long period of ideational, magical thinking followed by reality-oriented thinking; rather, intrapsychic elaboration and differentiation begin together. Representational differentiation depends both on being representationally engaged in thematic-affective areas and experiencing "cause and effect" feedback at a representational level. Parents must be able to engage their child and interpret experiences correctly at an intuitive level. The parent who keeps shifting meanings within the same thematic play will confuse the child. Also, the parent who confuses his/her own feelings with the child's feelings, or cannot set limits, may compromise the formation of a reality orientation in the child.

The child needs to learn how to shift gears between the make-believe and reality. Ordinarily this gradually occurs between 2 and 4 years of age. If representational elaboration is not occurring, the child is left with limited capacities to differentiate and use representational thought. One may also see characterological constrictions: people who cannot represent or differentiate aggression from sexuality, or who are left only with the behavioral-action mode or who are confused about their own and others' ideas or feelings in various thematic areas (but not other thematic areas).

Without access to the ideational mode and its differentiation, even in mild degrees, the seeds have been planted for either severe character pathology and/or neurotic conflicts. What is often referred to as magical thinking is more probable when representational elaboration and differentiation have not fully developed.

From middle childhood through adolescence, the capacity for developing and using extended representational systems and multiple extended representational systems increases. Earlier patterns are reenacted and reworked with developmentally relevant themes and complexity. This reenactment, reworking, and the frequent regressions to earlier patterns of functioning give rise to the special risks of preadolescence and adolescence discussed at this conference.

SUMMARIZING COMMENTS

Clinical work with persons with drug abuse problems indicates that certain areas of their functioning have been compromised: self-regulatory mechanisms and impulse control; their affective relationships with other persons; and ability to identify their own feeling states and those of other persons. Each of these is indicative of maladaptive patterns related to defects or constrictions of experiential organization from the early sensory, motor, and affective-thematic organizations of infancy to the representational organizations of early childhood. These "organizations" of the central nervous system have to do with the filtering and processing of perceptions and experience--the early sensory and affective-thematic organizations of infancy and childhood (table l)--upon which latter experiences become organized in symbolic thought, (e.g., the stages of development in the models reviewed by Bush and Iannotti and the substrate for the developmental stages discussed by Baumrind). Compromised organization, on the other hand, is associated with maladaptive patterns of behavior (e.g., those behaviors identified by Hawkins et al. as precursory indicators of risk for drug abuse, such as problem behaviors, poor impulse control, poor affective relationships, volatility of mood, and poor general performance of the child). Early limitations in "processing" and "organizing" experiences may, in many instances, be highly specific and reversible, rather than global, if early detection of sensory and affective-thematic organizational compromises can be identified and interventions provided for child and care providers. Interventions can build upon intact mechanisms and human relationships to generate or rebuild these fundamental CNS and affective-thematic organizations.

If, as Hawkins and his associates note in their review, personality factors have been found to be less predictive of substance use than behavioral or interpersonal factors, then one iS drawn into considering those attributes which precede behavioral and interpersonal phenomena which may also link or underlie personality factors as well. I would hypothesize that intersensory integration, self-regulatory mechanisms, affect regulation, attachment patterns, and eventually the symbolization of affect leading to interpersonal relations and capacity to relate to both persons and social conventions provide the keys to predisposing risk factors associated with risk for or avoidance of drug use.

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The Etiology and Prevention of Substance Use: What Can We Learn From Recent Historical Changes?

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INTRODUCTION

In this paper, I will review somewhat selectively what we have learned about trends in the use of illicit drugs among adolescents and young adults since the mid to early 1970s. I will try to emphasize those aspects which I believe have particular relevance for the development of primary and secondary intervention strategies. Some discussion will also be focused on what we know about trends in surrounding conditions which are potentially contributory to levels of use.

DATA SOURCES

I will rely primarily on two national data sources for these purposes—the National Household Survey on Drug Abuse (Miller et al. 1983) and the Monitoring the Future Study of high school seniors and young adults (Johnston et al. 1984). Both are based on nationally representative samples of their respective universes within the coterminous United States—members of households aged twelve and over in the case of the former study, and high school students nearing completion of their senior year in both public and private high schools, in the case of the latter. Both rely upon self-report methods for determining substance use, though the Household Survey involves face-to-face interviews in the home with privately completed answer sheets, while the Monitoring the Future Survey uses self-administered confidential questionnaires, which are group-administered to about 17,000 seniors in school each year and subsequently sent by mail to panels of about 1,000 seniors from each of the previous senior classes for up to ten years past high school.

Perhaps the most important characteristics shared by both studies are that they are ongoing series, which gives them the capacity to measure trends in both substance use and potentially related factors and that they encompass a wide range of substances, both licit and illicit. The National Household Surveys were begun in 1971 by the President's Commission on Marijuana with subsequent national surveys having been conducted in 1972, 1974, 1976, 1977, 1979, and 1982. One is also planned for 1985. The Monitoring the Future surveys began 4 years later, in 1975, and have been conducted annually since.

TRENDS IN SUBSTANCE USE AMONG ADOLESCENTS

It hardly bears repeating that from the late 1960s to the late 1970s the use of illicit substances burgeoned within the United States population in what has been widely described as a major epidemic. The use of marijuana, psychedelics like LSD and later PCP, the various psychotherapeutic drugs (such as stimulants, sedatives, tranquilizers, and analgesics), and eventually cocaine joined the traditional psychoactives of nicotine, alcohol, and caffeine as nearly commonplace on the American scene, at least for young people. Experimenting with one or more of these illicit substances by the end of high school became the majority behavior for American adolescents in the early 1970s and has remained so since. Experimenting with alcohol and cigarettes by that age had been a behavior of the majority for a long time prior to that-a fact which has not changed with the advent of the illicit drug use epidemic.

Within the broad contours of a growing drug epidemic, a great many distinctions can be made. Not all drugs have achieved equal popularity, nor have their levels of use changed in unison, nor have they reached all age groups at the same time. In the last several years there has been somewhat of a reversal of this seemingly unrelenting increase in drug use-a subject to which I will return later.

In the earliest years of the epidemic, the newly popularized forms of recreational drug use seemed to spring up on college campuses, with perhaps the most influential guru of the drug movement being himself a university professor, Timothy Leary. The phenomenon quickly reached the noncollege adults of similar age (Johnston 1973) and then began to spread progressively to younger ages. (See figures 1 to 5.) This epidemic also spread to older ages, though to a much lesser extent, and largely through generational replacement. (See figure 1.) This fact suggests that the teens and early twenties are a particularly important stage in the developmental process in which these drug using behaviors become established, or fail to become established. It appears that we will continue to observe important differences among birth cohorts throughout the life cycle as a function of which psychoactive substances were popular at the historical period when the cohorts were in their formative years. This serves to emphasize the importance of trying to influence the substance using proclivities of youth during those formative years.

Further, the change over time in age of onset, observable in figures 3, 5, and so on, illustrates another point—namely, that the age at which intervention is appropriate may change across historical periods. Whereas high school may have been the appropriate intervention point in 1970, certainly junior high school and perhaps even primary school became more appropriate in the mid to late seventies. In addition, the rapid short-term fluctuations in the visibility and potential popularity of particular drug—witness the rapid rise of PCP and cocaine—may also suggest that drug-specific interventions with age groups older than those receiving the most systematic prevention programs may be called for as new drug fads hit the scene.

In fact, the fluctuations in use of specific drugs which have occurred over the historical interval in question deserve attention because a certain tendency exists to think of the prevention of illicit drug use in

unidimensional terms. While we have reported earlier that the proportion of school age youngsters having any experience with illicit drugs other than marijuana or amphetamines has remained surprisingly constant for the last 10 to 15 years (see figure 6), this fact masks the wide variations and offsetting trends which have occurred for many specific classes of illicit drugs. For example, cocaine use increased sharply between 1976 and 1979 while the nonmedical use of tranquilizers and sedatives has shown a fairly steady long-term decline (see table 1). Similarly, PCP and daily marijuana use jumped sharply in the mid 1970s and then declined just as rapidly (Johnston et al. 1984).

PERCEIVED HARMFULNESS AS A DETERMINANT OF USE

Presumably, there were determinants of these sharp fluctuations—determinants which, if we understand them, may give us insight into how to prevent drug use in the future. A convincing case can be made for the role of the perceived dangers of using a drug. This is not an approach which finds high favor with many prevention specialists, but we should not be too quick to presume that there is only bath water in this tub. Fortunately, some of the evidence I can muster in support of this hypothesis is empirical and impressive. Other support is more impressionistic, but perhaps nevertheless convincing to many readers.

The strongest case to be made for the role of perceived harmfulness as a determinant of a particular drug using behavior is found in regular marijuana use. We reported that from 1975 to 1978 active daily (or near daily) marijuana use among high school seniors nearly doubled, rising from 6.0% to 10.7%. Between 1978 and 1983 it then dropped by one half, from 10.7% to 5.5%.

The data on availability suggest that it played practically no role in these changes, as evidenced by figure 11 and by other information from abstainers and quitters which suggest that price and availability have not been very significant factors in their nonuse (figures 12a and 12b). Nor have price and availability shown trends since 1977 which could explain the decline in use (figure 13). So, if we fail to find information on the supply side which can explain the downturn, we must look to the demand side.

Figures 14 and 15 trace two factors over time—the perceived harmfulness of regular marijuana use and perceived peer norms on the subject (that is, the perceived level of disapproval by the respondent's "close friends"). Both show significant changes since 1978—the peak year for daily use. Between 1977 (no measure was included in 1978) and 1983, the proportion of seniors who said their friends would disapprove of regular marijuana use rose by 9%, from 69% to 78%. (In fact, the proportion who said that they personally disapproved of regular marijuana use rose by 17% from 66% to 83%.) But most dramatic was the 28% increase (from 38% to 63%) between 1978 and 1983 in the proportion of seniors who thought regular marijuana use involved a "great risk" of harm to the user. (see figure 14.) A logical interpretation of these data is that changes in the beliefs concerning the harmfulness of regular marijuana use led to changes in personal disapproval which, when shared among friends, translated into changes in perceived peer norms. The fact that personal disapproval of regular marijuana use rose more quickly than perceived peer disapproval (see figure 15) helps to substantiate the last link in this sequence, The much more rapid increase

in perceived harmfulness than in personal disapproval provides some substantiation for the first link.

Further evidence of the primacy of health beliefs as determinants for the recent downturn in regular and occasional marijuana use, may be found in the reasons given by abstainers and quitters for their nonuse of marijuana. "Abstainers" here are defined as those who have never tried marijuana; while "quitters" are defined as those who have used once or more in the past, but who have not used in the past 30 days, and say they probably or definitely will not be using in the future. (see Bachman et al. 1984 for the full questions). Figures 12a and 12b give the frequency with which these two groups checked each of fourteen pre-specified reasons in the 1983 survey. Note that the two most frequently mentioned reasons deal with concerns about physical and psychological health effects. Further, an examination of figures 12c and 12d shows that quitters and abstainers have been mentioning these two concerns with increasing frequency in recent years. No other concerns show as sizeable an increase in mentions.

In sum, while the proof is not ironclad, the available evidence is certainly highly supportive of the notion that the beliefs about how harmful regular marijuana use is had a lot to do with the changes in use. If we had similar information on PCP—that is, data on the perceived harmfulness and the reasons for abstaining and quitting—I am virtually certain that we would find similar changes accompanying the sharp drop in active PCP use observed between 1979 and 1982, when annual prevalence dropped by more than two-thirds (from 7.0% to 2.2%). During that interval the considerable dangers of using PCP received widespread attention in the media, just as did the potential hazards of regular marijuana use.

1 also believe that the sudden leveling off in cocaine use after a period of rapid increase in use between 1976 and 1979 had in part to do with changed beliefs in the population about just how safe that drug was. In fact, the proportion of seniors stating that regular cocaine use poses a "great risk" for the user rose between 1979 and 1983 from 69% to 74% (Johnston et al. 1984).

An emphasis on health consequences has not been held in high favor in recent years by the prevention community, perhaps because the "scare tactics" sometimes used in schools apparently failed, as did the government sponsored publicity campaigns of the early 70s through the media. Further, some suggest that all the evidence in the Surgeon General's reports on smoking still have not curtailed smoking.

I would emphasize several different points in response. To take the last contention first, a lot of people did quit smoking as a fairly direct result of the Surgeon General's report and many of the remainder wish to quit. What must be taken into account in this case is the highly dependence-producing nature of the drug. Wanting to quit does not translate directly into quitting once the habit is established. Between 1977 and 1981 we observed nearly a one-third decrease in the proportion of seniors who smoked daily, and an examination of their age-at-onset patterns (see figure 10) shows that in the recent graduating classes, not only are fewer students smoking in senior year, but fewer of them began smoking regularly at earlier ages. In other words, good evidence exists of a cohort effect with the differences in behavior between classes being established at quite an early age. Perhaps

cohort differences in underlying attitudes and beliefs were established at a still earlier age. As figure 14 illustrates, the perceived harmfulness of smoking was rising with subsequent senior classes up through 1980. These changed attitudes very likely are "residual" from changes which could have been observed as early as age ten or eleven. In my opinion, the overall evidence on smoking strongly suggests that heightened health concerns have had a substantial effect on both the rates of initiation and quitting.

As far as the apparent failure of the government's media propaganda campaign of the early seventies and the scare tactics used in school at that time are concerned, what they may have had in common was that the "health" messages came from senders who did not have credibility with the target audience. Alienation from "the system" was at its peak among youth in the early 1970s and, in fact, the use of certain drugs—in particular marijuana and hallucinogens—was an expression of membership and sympathy with the "counter culture" (Johnston 1973). The President's Commission on Marihuana even went so far as to entitle their first report "Marihuana: A Signal of Misunderstanding." Clearly the target audience was not receptive to any messages from the system which cast negative connotations on such drug use. Further, the senders often depleted whatever little credibility they might have been able to muster by an overemphasis on propaganda and an underconcern with accuracy and balance. No wonder, then, that these early efforts either failed, or perhaps even backfired.

Different factors are now operant. The sources of the hazard messages—largely scientists and the media—have credibility with young people. Their messages can be heard and believed, partly because young people are more ready to hear and partly because these sources have so far retained credibility. Further, recent classes may have had more of a chance than their predecessors for some vicarious learning derived from firsthand observation of the effects of chronic drug involvement. The commonly used label of "burnouts" for users of drugs provides some semantic evidence to this effect.

Causes Of The Overall Downturn

Earlier the beginnings of a downturn in youthful drug use in recent years was mentioned. Substantiation may be found in both the series of surveys discussed. Exactly what the causes have been is open to interpretation. My hypotheses include: (a) the "fad" quality of drug use is beginning to wear off; it's becoming "old hat"; (b) the symbolic value of drug use as a form of rebellion against the system and the adult world has declined as some of the major historical reasons for that rebellion (in particular, the Vietnam War) have receded into the past, and as the "shock value" of drug use has ebbed; (c) drug use is seen as inconsistent with the recent secular movement toward more healthy lifestyles; (d) young people have become more able to "hear" the cautions which the system has to tell them about drugs; and (e) "the system" has become more sophisticated, believable, and consistent in its communications with youth about drugs. By "the system" I mean government, the schools, the media, the scientific community, and parents.

If I am correct about these factors related to the development of credible communication between "the system" and youth, it follows that a terribly important resource, one to be vigoriously protected, is that of credibility. Overzealous influence attempts which become more propagandistic than factually based can serve to destroy that resource. I believe all of those genuinely concerned with preventing drug abuse among our youth should weigh this heavily in their actions.

If beliefs about the physical and psychological consequences of various drugs substantially affect use, it also follows that a continuing program of research on the effects of short- and long-term use is particularly important; and that continuous efforts should be made to get these findings to the public. Communicating such information to young people early enough to have an impact before some "critical mass" already begins use may be important, as well.

How The Surveys Might Be Used In Prevention

In closing this section on drug use during adolescence, let me mention some of the ways in which I believe surveys—such as those in the two survey series I have been discussing—can provide material of assistance in the development of prevention programs.

1) They can be used to affect normative behavioral expectations, by showing that "not everybody is doing it," whatever "it" may be, either among people of the same age as the target audience, or among somewhat older groups who may serve as role models.

2) Survey results may be used to influence perceived normative values, by showing, for example, that most young people disapprove of even trying all illicit drugs except marijuana (Johnston et al. 1984).

3) The images or perceived social connotations of using various drugs may be influenced by feeding back results on the images most young people have of being users of various drugs. The Monitoring the Future study, for example, released findings on the ways in which smoking tended to change the manner in which a senior is perceived by his or her peers—changes which were nearly all unfavorable.

4) The problems reported by users to have resulted from their use of various drugs may be emphasized. For example, Johnston (1981) reported that of the daily marijuana users in recent surveys, fully 42% thought it caused them to have less energy, one-third thought it made them less interested in other activities, one-third thought it hurt their school and/or job performance, etc.

DRUG USE IN EARLY ADULTHOOD

The other subject on which I was asked to comment is the nature of drug use patterns after high school. Because of its cohort-sequential design, the Monitoring the Future Study is particularly well suited to the difficult task of disentangling secular changes (that is, cross-time changes observed

across age groups) from maturational changes (that is, changes with age common to different birth cohorts) from cohort specific changes (that is, lasting differences which are only observed in certain birth or class cohorts). We believe it is important to try to disentangle these different factors lest one be mistaken for another.

To take but one example, figure 16 shows the monthly prevalence of marijuana use derived from panel studies of the various class cohorts to graduate since 1976. As can be seen, the Classes of 1976 and 1977 showed sizeable increases in use in the two years after graduation. This could have been interpreted as an age-related pattern of change, generalizable to other cohorts. However, the Classes of 1978 and 1979 showed practically no change in usage rates in the two years after graduation, and the subsequent classes actually showed substantial declines in the comparable interval. The most parsimonious explanation of these changes is that secular (or period) trends are what accounts for nearly all of the change in use observed in these various panels, and, O'Malley et al. (1984), report that in a weighted least squares regression analysis, the optimal fit indicates a quadratic period effect (that is, an increase and then a decrease) and no age or cohort effects. (The article covers the period from 1976 to 1982 and the age range from 18 to 24 years.)

The comparable analyses for annual cocaine use (see figure 17) suggest both a period and an age effect (up to age 21, but not beyond).

The cohort effect deduced above for cigarette smoking, based on the grade of first use, mentioned earlier, is confirmed in the panel data on post-high school use (figure 18). A particularly interesting finding emerged in the case of cigarettes, since there is no age-related change after high school in the 30-day prevalence of smoking (figure 18), but there is a large age-related change in the prevalence of heavy daily smoking; and it occurs in the first year after high school (figure 19). In essence, there are not more smokers after high school, but a number of the occasional ones become heavy smokers during that period. Depending on what the dynamics prove to be, this may suggest a critical point for intervention.

The ongoing declines in the use of tranquilizers and barbiturates, mentioned earlier for seniors, show up as period effects among young adults, as well (see figure 20). A similar decline is reported for hallucinogens, other than LSD, taken as a group; and recent analyses suggest a recent downward secular trend for stimulants and methaqualone (figures not shown).

Regarding age effects, monthly and daily prevalence rates for alcohol appear to increase with age (up to age 24—the upper limit in the analysis), whereas heavy party drinking shows a curvilinear trend, first increasing and then decreasing (no data shown). The use of narcotics other than heroin has shown little by way of any secular trend, but has shown a rather consistent linear decrease with age (O'Malley et al. 1984).

In another recent article (Bachman et al. 1984) we examine the effects of certain role transitions after high school—in particular, leaving the parental home, getting married, going to college, and getting a job. Among the key findings: getting married is associated with a decrease in most kinds of drug use, leaving the parental home to enter other nonmarriage living arrangements (including apartments and dormitories) is associated

with an increase in use, while remaining in the parental home is associated with no change in use. These relationships are little affected, nor is their explanatory power much augmented, by the inclusion of student status or employment status.

CONCLUSION

As has been noted throughout this paper, there is rather strong evidence of a recent secular downturn in the use of a number of illicit drugs (figure 21). Usage levels still remain very high by historical standards; but this period of downward movement may prove a particularly opportune one for achieving prevention results. In my view, those trying to prevent drug involvement on the part of young people are finally moving with the current, instead of against it, and the potential for achieving appreciable results may be better now than at any time in the past 20 years.

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TABLE 1

Trends in Annual Prevalence of Sixteen Types of Drugs

	Percent who used in last twelve months								
	Class of 1975	Class of 1976	Class of 1977	Class of 1978	Class of 1979	Class of 1980	Class of 1981	Class of 1982	'81-'82 change
Approx. N =	(9400)	(15400)	(17100)	(17800)	(15500)	(15900)	(17500)	(17700)	
Marijuana/Hashish	40.0	44.5	47.6	50.2	50.8	48.8	46.1	44.3	-1.8
Inhalants[a]	NA	3.0	3.7	4.1	5.4	4.6	4.1	4.5	+0.4
Inhalants Adjusted[b]	NA	NA	NA	NA	*9.2*	*7.8*	*6.0*	*6.6*	+0.6
Amyl & Butyl Nitrites[c]	NA	NA	NA	NA	6.5	5.7	3.7	3.6	-0.1
Hallucinogens	11.2	9.4	8.8	9.6	9.9	9.3	9.0	8.1	-0.9
Hallucinogens Adjusted[d]	NA	NA	NA	NA	*12.8*	*10.6*	*10.1*	*9.3*	*-0.8*
LSD	7.2	6.4	5.5	6.3	6.6	6.5	6.5	6.1	-0.4
PCP[c]	NA	NA	NA	NA	7.0	4.4	3.2	2.2	-1.0s
Cocaine	5.6	6.0	7.2	9.0	12.0	12.3	12.4	11.5	-0.9
Heroin	1.0	0.8	0.8	0.8	0.5	0.5	0.5	0.6	+0.1
Other opiates[e]	5.7	5.7	6.4	6.0	6.2	6.3	5.9	5.3	-0.6
Stimulants[e]	16.2	15.8	16.3	17.1	18.3	20.8	26.0	26.1	+0.1
Stimulants Adjusted[e,f]	NA	NA	NA	NA	NA	NA	NA	*20.3*	--
Sedatives[e]	11.7	10.7	10.8	9.9	9.9	10.3	10.5	9.1	-1.4ss
Barbiturates[e]	10.7	9.6	9.3	8.1	7.5	6.8	6.6	5.5	-1.1ss
Methaqualone[e]	5.1	4.7	5.2	4.9	5.9	7.2	7.6	6.8	-0.8
Tranquilizers[e]	10.6	10.3	10.8	9.9	9.6	8.7	8.0	7.0	-1.0s
Alcohol	84.8	85.7	87.0	87.7	88.1	87.9	87.0	86.8	-0.2
Cigarettes	NA	NA	NA	NA	NA	NA	NA	NA	NA

NOTES: Level of significance of difference between the two most recent classes:
s = .05, ss = .01, sss = .001.

NA indicates data not available.

[a]Data based on four questionaire forms. N us four-fifths of N indicated.

[b]Adjusted for underreporting of amyl and butyl nitrites (see text).

[c]Data based on a single questionaire form. N is one-fifth of N indicated.

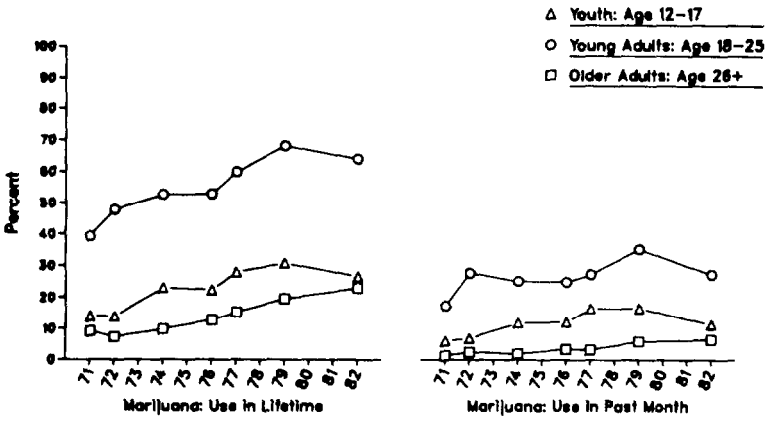
[d]Adjusted for underreporting of PCP (see text).

[e]Only drug use which was not under a doctor's orders is included here.

[f]Adjusted for overreporting of the non-prescription stimulants. Data based on three questionaire forms. N is three-fifths of N indicated.

FIGURE 1

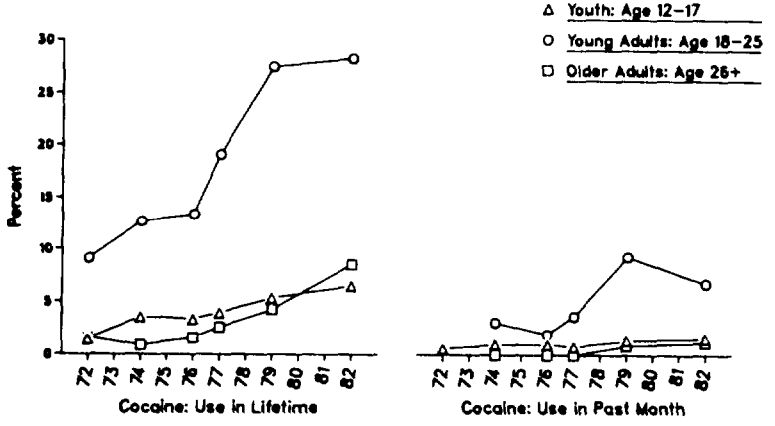
Marijuana: Lifetime Prevalence and Past Month Use for Youth, Young Adults, and Older Adults, 1971-1982



Numbers of cases in the "youth" category range from 781 to 2,165 per year; in the "young adults" category, 741 to 2,044; and in the "older adults" category, 1,613 to 3,015.

FIGURE 2

Cocaine: Lifetime Prevalence and Past Month Use for Youth, Young Adults, and Older Adults, 1972-1982



Numbers of cases in the "youth" category range from 880 to 2,165 per year; in the "young adults" category, 772 to 2,044; and in the "older adults" category, 1,613 to 3,015.

FIGURE 3
Use of Any Illicit Drug: Trends in Lifetime Prevalence for Earlier Grade Levels Based on Retrospective Reports from Seniors

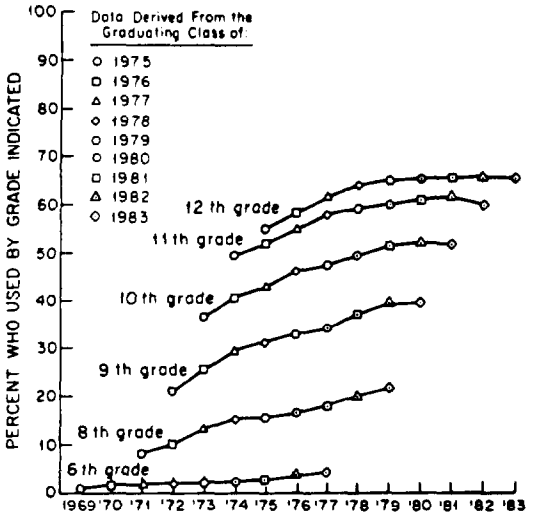
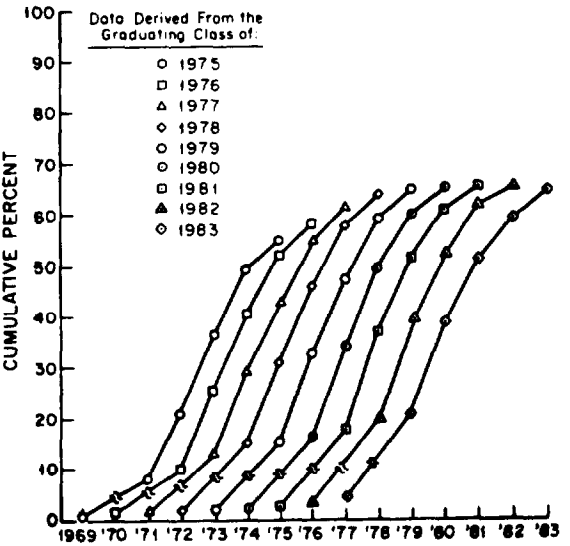


FIGURE 4
Use of Any Illicit Drug: Cumulative Lifetime Prevalence for Each Graduating Class by Grade Level



NOTE: Each ascending cure represents the cumulative lifetime prevalence for a single graduating class, with the six sequential points demarcating (from left to right) the following grade levels: 6th, 8th, 9th, 10th, 1lth, and 12th.

FIGURE 5

Marijuana Trends in Lifetime Prevalence for Earlier Grade Levels Based on Retrospective Reports from Seniors

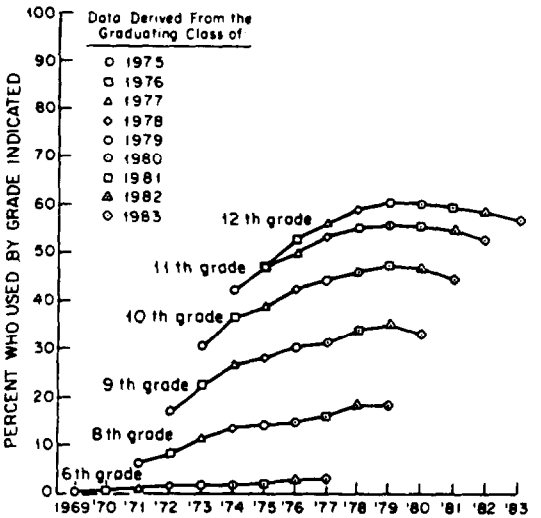


FIGURE 6

Use of Any Illicit Drug Other Than Marijuana or Amphetamines: Trends in Lifetime Prevalence for Earlier Grade Levels Based on Retrospectlvc Reports from Seniors

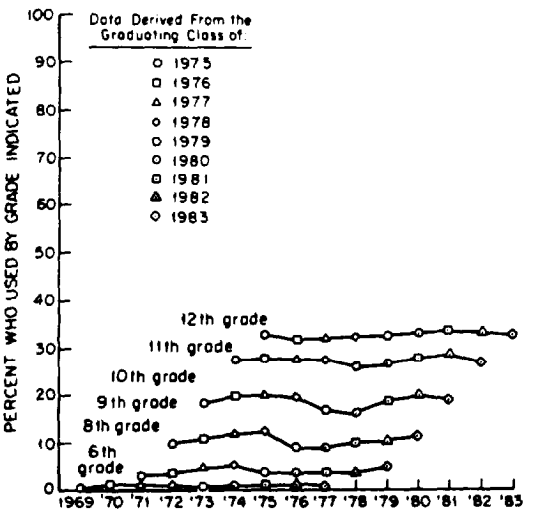


FIGURE 7

PCP: Trends in Lifetime Prevalence for Earlier Grade Levels Based on Retrospective Reports from Seniors

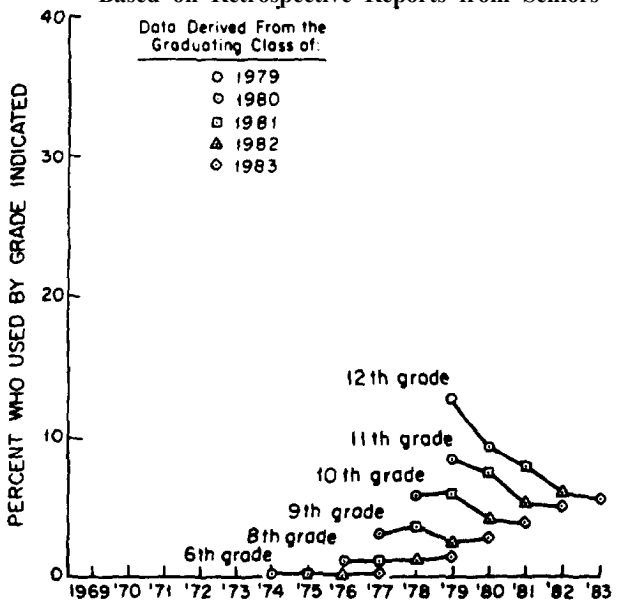


FIGURE 8

Stimulants: Trends in Lifetime Prevalence for Earlier Grade Levels Based on Retrospective Reports from Seniors

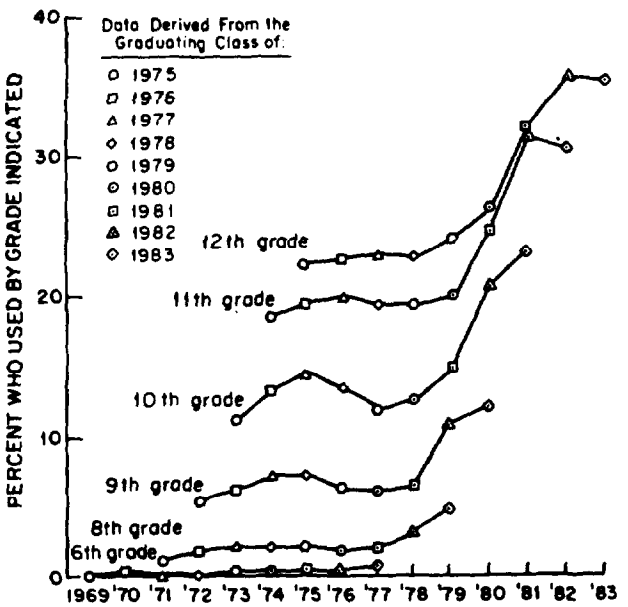


FIGURE 9

Alcohol: Trends in Lifetime Prevalence for Earlier Grade Levels Based on Retrospective Reports from Seniors

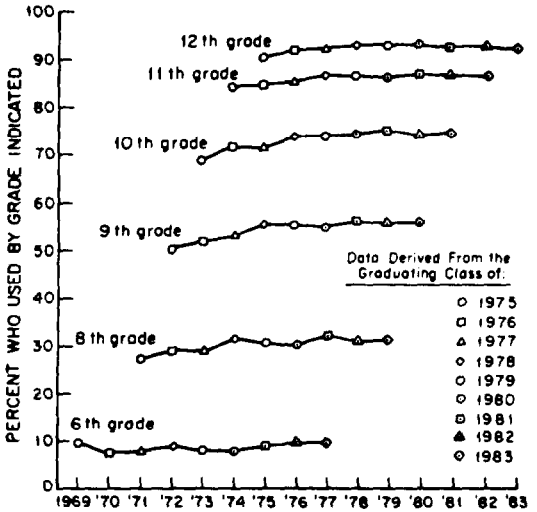


FIGURE 10

Cigarettes

Trends in Lifetime Prevalence of Daily Use for Earlier Grade Levels Based on Retrospective Reports from Seniors

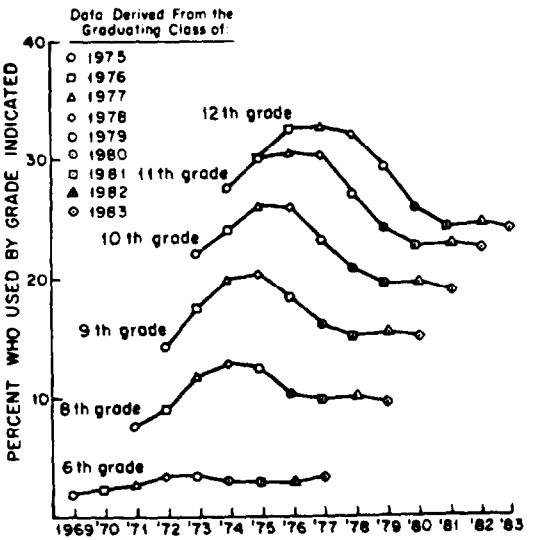
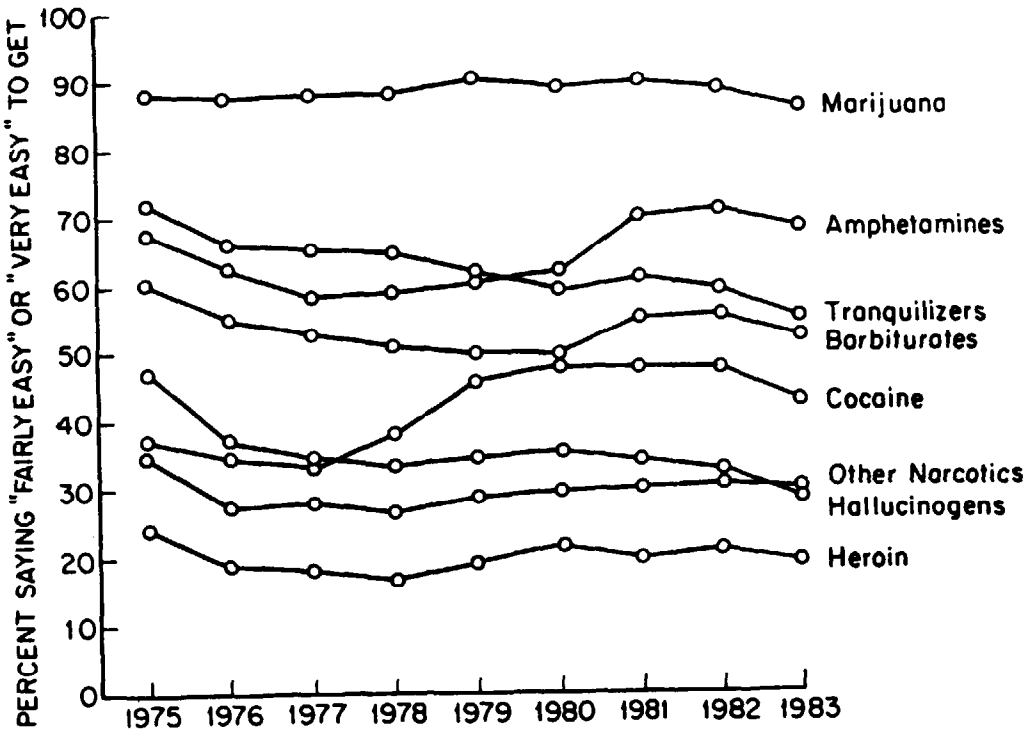


FIGURE 11

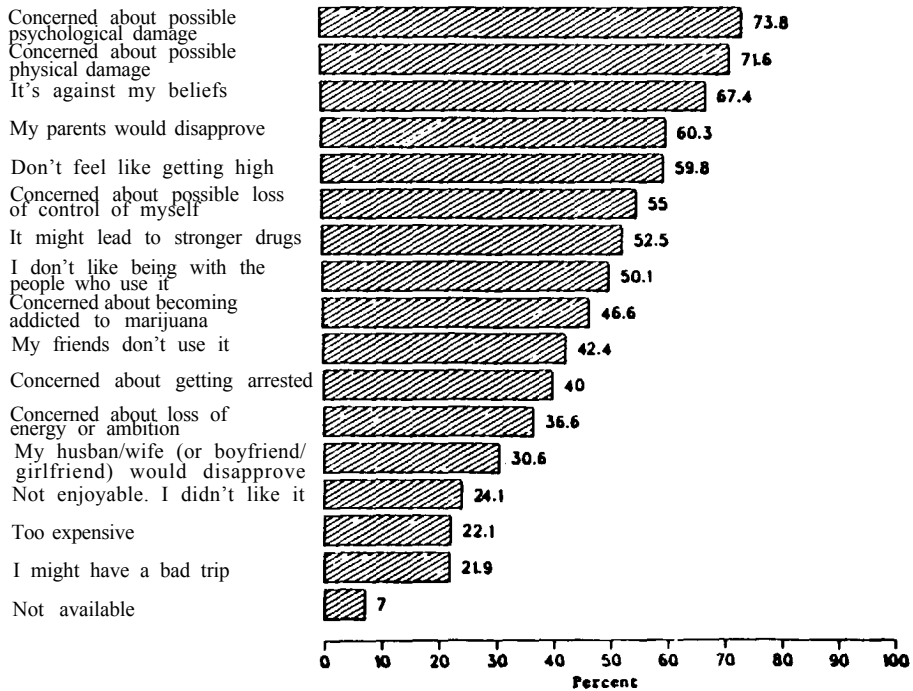
Trends in Perceived Availability of Drugs



Here are some reasons people give for not using marijuana, or for stopping use. If you heve never used marijuana, or If you have stopped using it, please tell us which reasons are true for you. (Mark all that apply.)

FIGURE 12a

Reasons for Abstaining from Marijuana Use, Class of 1983 (N = 1,347)



Here are some reasons people give for not using marijuana, or for stopping use. If you have never used marijuana, or if you have stopped using it. please tell us which reasons are true for you. (Mark all that apply.)

FIGURE 12b

Reasons for Quitting Marijuana Use, Class of 1983 (N = 1,005)

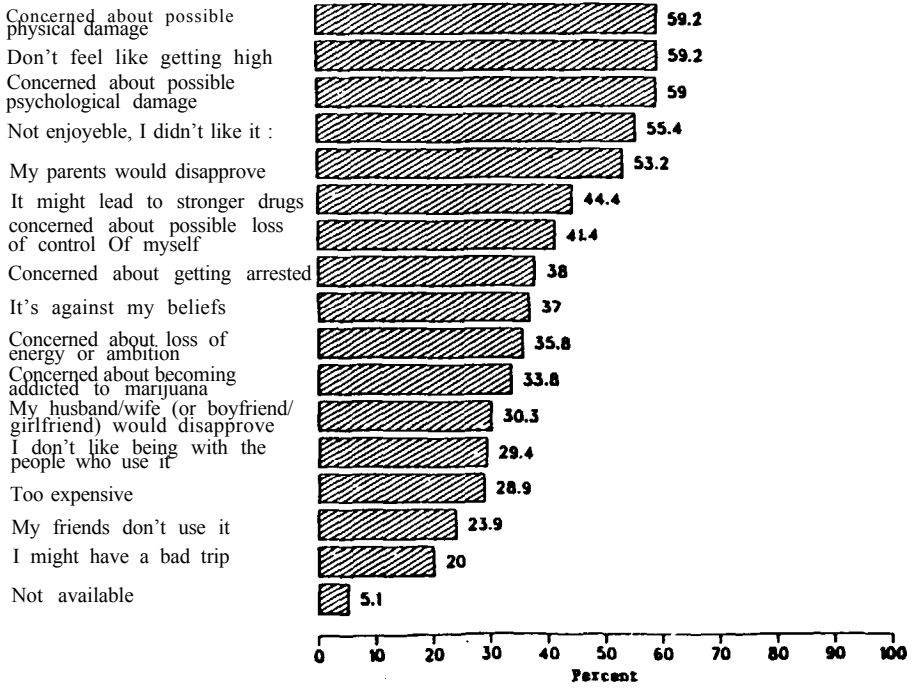
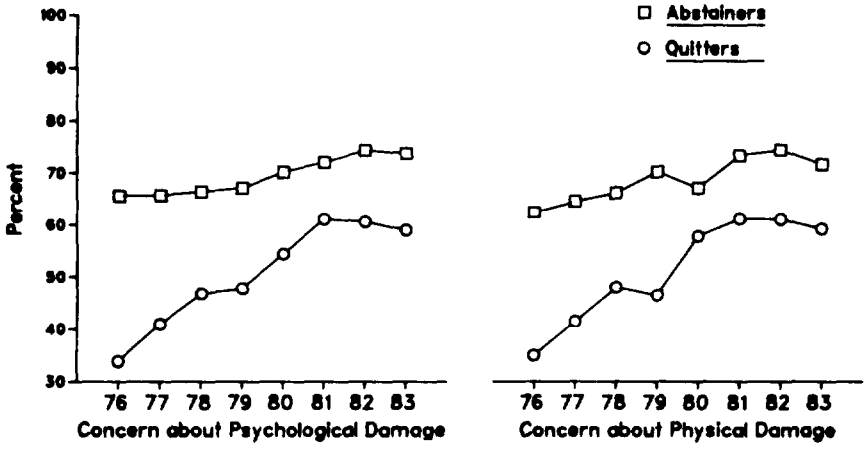


FIGURE 12c & d

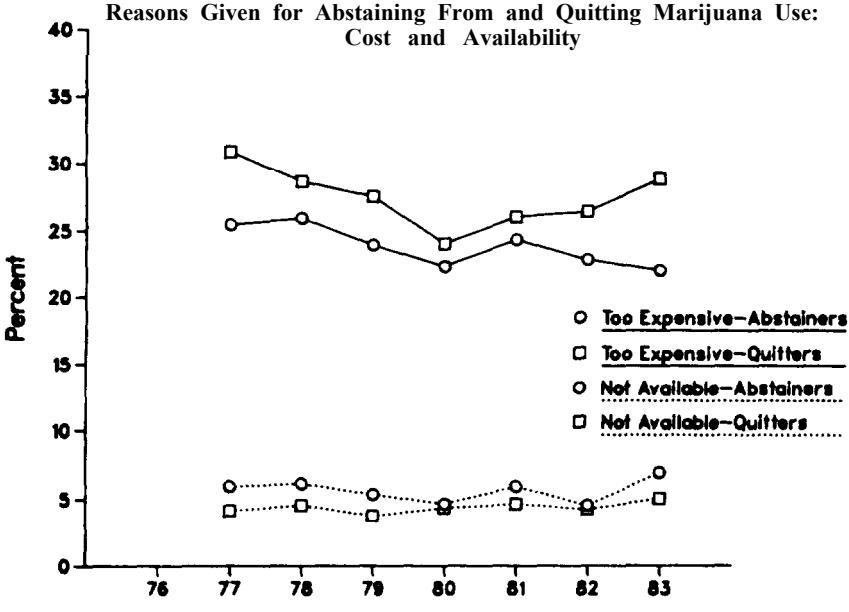
Reasons Given for Abstaining From and Quitting Marijuana Use: Possible Physical and Psychological Harm



Weighted N's for abstainers range from 1,198 to 1,808 each year; weighted N's for those who quit using marijuana range from 730 to 1,067.

FIGURE 13

Reasons Given for Abstaining From and Quitting Marijuana Use: Cost and Availability



Weighted N's for abstainers range from 1,198 to 1,808 yearly; weighted N's for those who quit using marijuana range from 787 to 1,067.

FIGURE 14

Trends in Perceived Harmfulness: Marijuana and Cigarettes

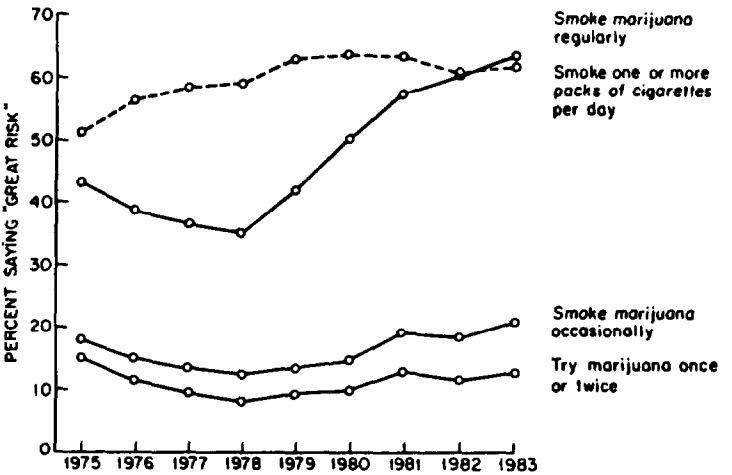


FIGURE 15

Trends in Disapproval of Illicit Dry Use
Seniors, Parents, and Peers

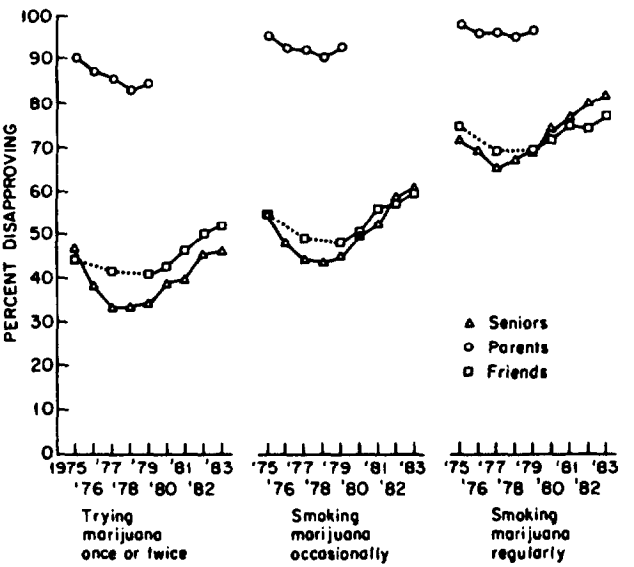
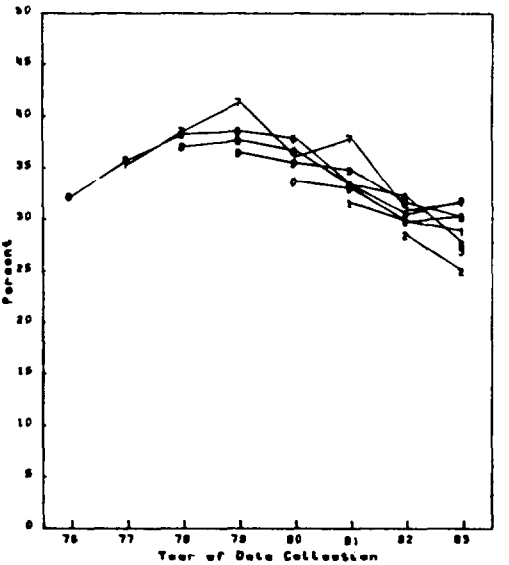


FIGURE 16

Marijuana: Cross-age Trends in 30-day Prevalence for Seven Panels



The number used to differentiate each panel in this figure (and figure 17 through 20) is the lest digit of the high school class year of the panel.

FIGURE 17

Cocaine Cross-age Trends in Annual Prevalence for Seven Panels

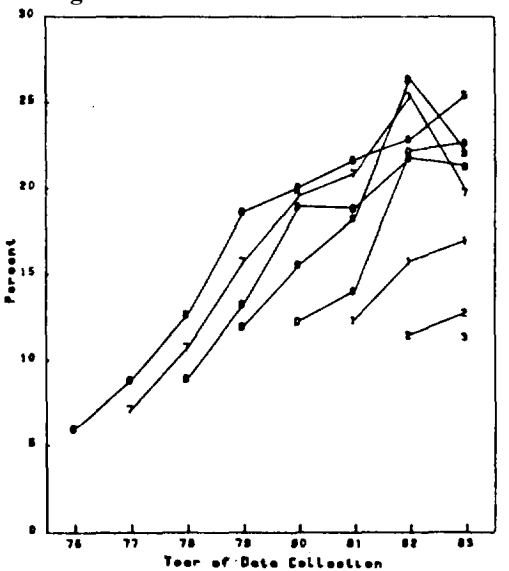


FIGURE 18

Cigarettes: Cross-age Trends in 30-day Prevalence for Seven Panels

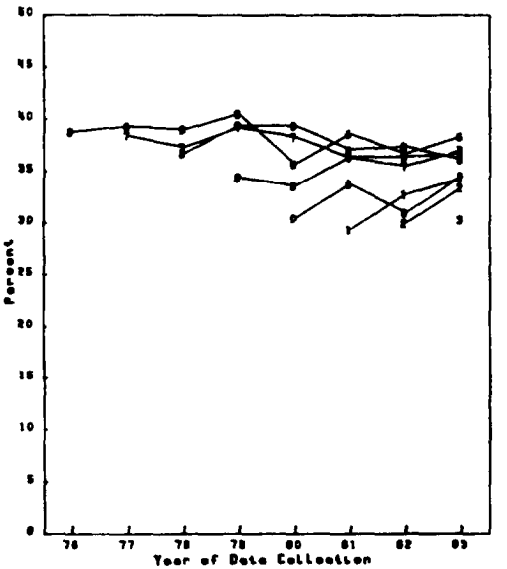


FIGURE 19

Cigarettes

Cross-age Trends in Daily Use of 1/2+ Packs per day for Seven Panels

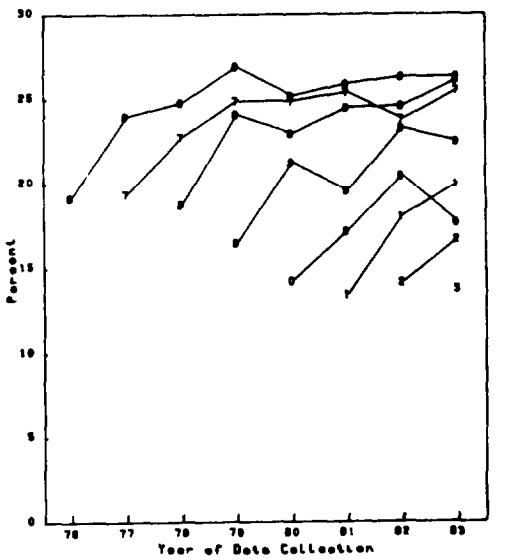


FIGURE 20

Barbiturates: Cross-age Trends in Annual Prevalence for Seven Panels

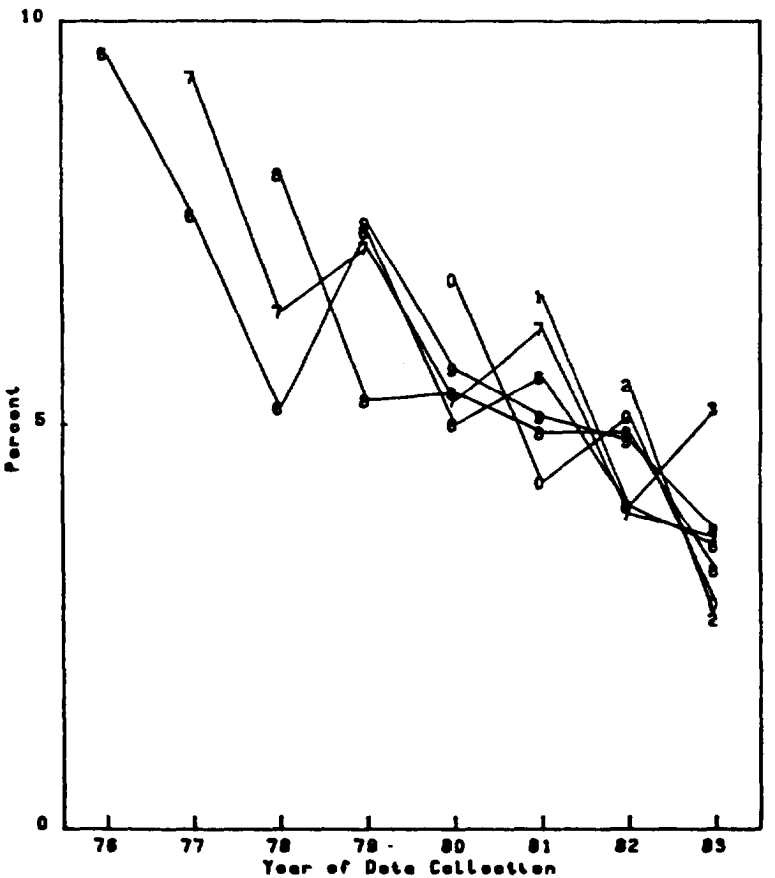
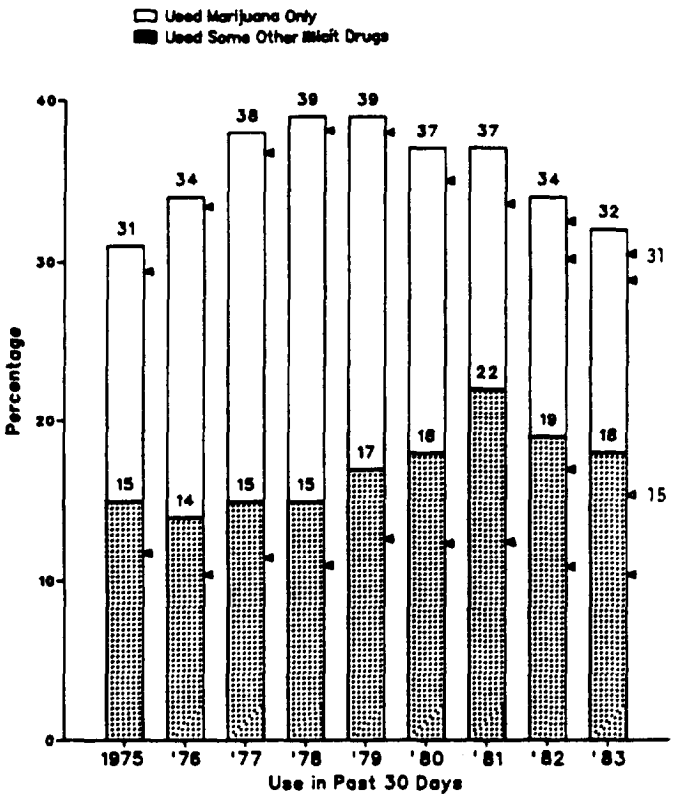


FIGURE 21

Trends in 30-Day Prevalence of an Illicit Drug Use Index



NOTES: Use of "some other illicit drugs" includes any use of hallucinogens, cocaine, and heroin, or my use which is not under a doctor's orders of other opiates, stimulants, sedatives, or tranquilizers

indicates the percentage which results if all stimulants are excluded from the definition of "illicit drugs." shows the percentage which results if only non-prescription stimulants are excluded.

The bracket near the top of a bar indicates the lower and upper limits of the 95% confidence interval.

Age of Onset of Drug Use as a Factor in Drug and Other Disorders

Lee N. Robins, Ph.D., and Thomas R. Przybeck, Ph.D.

Although much has been learned in the last dozen years about the correlates and frequency of illicit drug use in adolescents and young adults, gaps remain in our understanding of the causes and consequences of such drug use. Few studies have provided the information about the temporal order between onset of drug use and associated events that could tell us which correlates are causes of drug use and which are its consequences. In addition, there has been relatively little effort to distinguish use from problems arising from use. Indeed, the terms use and abuse have often been used interchangeably. While the illegal status of drugs may partly justify this usage, since any use carries the potential for the user's arrest, in practice few users are arrested and many users do not appear to suffer serious consequences. Nonetheless, the consequences are very serious for some users and, therefore, it is important to distinguish predictors of use from the predictors of problem use.

The few attempts to explore problem use suggest that the potential for problems is significantly greater for those who begin use early in life than for those who begin use later and, therefore, age of first use appears to be a critical variable. Despite the predictive power of age of onset, there is little OF no information as to whether the predictors of drug use are different at different ages of initiation. If they are, predictors of age of initiation may be what forecasts outcome Father than early use itself.

Drug use has been increasingly common among the young for about the last 15 years, a period long enough to allow looking at cohort differences. Have the causes and consequences of drug use changed in later cohorts as drug use has become more common?

Finally, there is the issue of the relationship between drug abuse and dependence and other psychiatric disorders. The problems of drug abuse have typically been explored independently of other

psychiatric disorders, making it difficult to understand how drug abuse and dependence fit into the general rubric of psychopathology.

An opportunity to address each of these questions arises as a result of the Epidemiological Catchment Area Program (ECA), a large-scale study supported by the National Institute of Mental Health (NIMH), that has investigated the lifetime and current history of drug abuse and dependence along with other major psychiatric disorders in adults of all ages living in five sites: New Haven, Baltimore, St. Louis, North Carolina, and Los Angeles. The samples in the first three sites were interviewed between 1979 and 1981 initially, and reinterviewed a year later.

Dependence and abuse were assessed according to criteria in DSM-III for six categories of drugs: barbiturates, hypnotics, and sedatives; opioids; cocaine; amphetamines and other stimulants; PCP and similar drugs; and cannabis. These criteria require that the drugs be taken "on one's own." Dependence on prescription drugs taken according to doctor's orders does not qualify. Dependence requires either tolerance to the drug (needing more to get the same effect or ability to take much larger quantities than initially) or withdrawal (symptoms arising from stopping or cutting down on the amount used) and either social problems or a pattern of pathological use, such as being unable to control use. The diagnosis of abuse requires both a social problem from use and a pathological pattern of use. While DSM-III allows the diagnosis of both abuse and dependence in one individual, we will divide subjects into those with dependence (with or without abuse), abuse only, and neither drug disorder.

The assessment instrument in the ECA program is the Diagnostic Interview Schedule (DIS), written for this study at Washington University in St. Louis with the assistance of the principal authors of DSM-III and, for drug questions, with the consultation of NIDA staff. In addition to covering the specific symptoms of abuse and dependence listed in DSM-III, the interview asks whether any illicit drugs have been used, at what age they were first used, which drugs have been used at least five times, whether any of four criteria for seriousness of problems have been experienced (speaking to a doctor about the problem, speaking to another professional about the problem, taking medication as a result of the problem more than once, or feeling that the problem has interfered with one's life or activities a lot), which drugs have created problems in the last year, and the age at first and last drug problem.

Similar questions are asked about age of first and last symptom of other diagnoses, and age of first experience of childhood behaviors: stealing, lying frequently, running away, arrests, problems as a result of fighting, school expulsion, underachievement at school, and vandalism. These questions make possible discovering the temporal order between first drug use, first drug problem, and a number of symptoms and behaviors thought

to be the precursors of drug use and problems. However, recall of the age at which each of these events first occurred is undoubtedly subject to error, and consequently there are errors in temporal ordering. This paper partially overcomes this handicap by restricting analyses to responses by sample members below the age of 35, thus limiting the number of years over which recall of ages of onset of these early events is required.

METHODS

The first wave of ECA community sample results are available from three sites, New Haven, Baltimore, and St. Louis; data from the second wave is also available from St. Louis. Each of these sites was sampled in traditional area-sampling fashion. Respondents were representative of the population 18 years of age or older. Weights were constructed to compensate for design effects (e.g., the oversampling of the elderly in New Haven and Baltimore and of blacks in St. Louis, and for selecting only one person per household) and for sampling errors and non-response, so that the weighted sample has the same age, sex, and racial composition as appears in the 1980 census of the adult population in the areas sampled.

Overall lifetime rates of drug abuse and dependence by age, sex, race, and education will be presented for three sites. The presence of abuse of or dependence on at least one of the drug classes covered will be studied, without attempting to distinguish among drug classes. The effort to identify possible causes of drug use and problems and of the relationship of age of onset of use to later diagnoses will be restricted to the St. Louis sample under the age of 35. One of the advantages of the collaborative design is that it will be possible to replicate these results in the future in other sites with the collaboration of their staff.

RESULTS

Table 1 shows the lifetime prevalence, by age and sex, of abuse or dependence on at least one of the six classes of drugs listed above in the three ECA sites. There are three important findings: First, overall rates of drug disorders are nearly identical across sites. Second, even though the youngest group has had the fewest years at risk of developing one of these disorders, they have the highest lifetime prevalence. This emphasizes the fact that the drug epidemic beginning in the late 1960s was an epidemic only among the young. Persons now 45 or older had virtually no exposure to that epidemic, and drug disorders among those over 34 are rare. It is for this reason that our causal analyses will be limited to those under 35. Otherwise, the age distributions among those affected and unaffected by a drug disorder would be so different as to make all findings questionable. Third, more males than females developed drug disorders, but the differences are not great. The relative risk for males across the three sites is between 1.3 to and 1.9 times greater than for females. The sexes appear to be converging in their rates of drug disorders, since

among the youngest group, the relative risk for males varies only from 0.9 to 1.6, close to the value of 1.0, which would mean an equal risk for the two sexes.

TABLE 1

Lifetime Drug Abuse And Dependence
By Sex and Age
(ECA Wave I)

	NEW HAVEN (3,042) %	BALTIMORE (3,481) %	ST. LOUIS (3,004) %
TOTAL	5.8	5.6	5.5
18-24	17.4	12.0	11.0
25-44	7.2	9.0	8.3
45-64	0.6	0.6	0.6
65+	0.1	0.0	0.1
MALES	6.5	7.1	7.4
18-24	17.9	11.1	13.5
25-44	8.4	13.0	11.9
45-64	0.3	0.6	0.0
65+	0.2		0.0
FEMALES	5.1	4.4	3.8
18-24	17.0	12.8	8.7
25-44	6.0	5.4	5.0
45-64	0.1	0.5	1.2
45-64	0.0	0.0	0.2

Table 2 shows the relationship of three additional demographic variables to drug abuse and dependence. Drug disorders are approximately equally common in blacks and whites, and in college graduates and those with less education. In St. Louis, the only site which included a small town and rural area, drug disorders were found to be more frequent in the inner city than in rural areas.

Drug disorders are classified in terms of whether they involve dependence or only abuse, and in terms of severity as measured by the criteria described above. Table 3 shows the relationship between drug disorders and other common psychiatric disorders for members of the St. Louis sample below the age of 35. Two of these diagnoses, alcohol abuse and dependence and antisocial personality, are much more common in males than females. Three diagnoses, major depressive episode, dysthymia, and phobia, are more common in females than males. Tobacco use disorder is about equally frequent in the two sexes. Because of the striking association of these disorders with sex, the data on males and females are presented separately.

The diagnostic criteria for alcohol abuse and dependence parallel the criteria for drug abuse and dependence. As table 3 shows, drug dependence and severity are additive in their relationship to alcohol disorders. Among men with severe drug dependence, 75% had an alcohol disorder. Dependence has more effect than severity, but the rate declines steadily as one moves to non-severe dependence, severe abuse, non-severe abuse, and is lowest (27%) in those without a drug diagnosis. For women, the distinction between dependence and abuse is less striking, but the same regular pattern appears; 36% of those severely dependent on drugs have an alcohol disorder vs. 4% of those with no drug disorder. The greater number of alcohol disorders among men than women is visible at every level of drug disorder.

DSM-III criteria for antisocial personality require three conduct problems (e.g., stealing, truancy, fighting) before age 15 and four adult symptoms, such as poor work history, fighting, irresponsibility toward spouse and children, and illegal activities.

Drug abuse is counted as a symptom of antisocial personality, both before 15 and in adulthood, but is not a required symptom. The pattern of relationships between antisocial personality and drug abuse and dependence parallels that of alcohol disorders for men, with rates of antisocial personality ranging from 68% in those severely dependent on drugs to 8% in those with no drug disorder. Rates of antisocial personality in women are much lower, and it is probably for that reason that patterns are less clear. However, rates of antisocial personality are greatly elevated in women with all types of drug disorders except non-severe abuse.

TABLE 2

Lifetime Druq Abuse And Dependence
By Race, Education, And Urbanization
(Three ECA Sites)

	NEW HAVEN		BALTIMORE		ST. LOUIS	
	N	%	N	%	N	%
BLACK	334	6.4	1182	7.3*	1158	6.4
WHITE + OTHER	2708	5.7	2299	4.9	1846	5.3
COLLEGE GRADUATE	839	5.2	303	8.2	416	4.5
OTHER	2218	6.0	3174	5.4	2498	5.8
INNER CITY	--	--	--	--	983	8.1*
SUBURB	--	--	--	--	1297	5.6
RURAL + SMALL TOWN	--	--	--	--	740	4.3

* p<.05

Diagnostic criteria for the two depressive disorders, major depressive episode and dysthymia, differ in that a major depressive episode requires the conjunction of low mood and at least four other symptoms (e.q., insomnia, weiqht loss, fatique, poor concentration, suicidal ideation) for at least 2 weeks, while dysthymia requires low mood over most of a 2-year period but fewer associated symptoms. Criteria for a phobia consist of a fear which is perceived by the person afflicted with it as unreasonable and is so severe that it leads to avoidance of the feared object to a deqree that results in meetinq the severity criteria outlined above. In women, each of these disorders is most frequent in those with severe drug abuse but no dependence and next most frequent in those with severe dependence. Non-severe drug disorder, whether abuse or dependence, is not strongly associated with major depressive episode, dysthymia, or phobia in women. In men, in whom these disordes are rare, patterns of association are less clearcut. Major depressive episodes are most common in men with severe dependence, while dysthymia and phobia are most common in men with severe abuse.

Tobacco dependence is a newcomer to psychiatric nosoloqy. It is defined as smokinq when medically contraindicated by existent disease, or sufferinq withdrawal symptoms when attempting to quit smokinq, or relapsinq to smokinq after quittinq. A large proportion of all persons who have been heavy cigarette smokers

TABLE 3
Association Of Drug Disorders With Other Disorders
In Young St. Louis Adults

		Depend., severe (M=25;F=15) %	Depend., not sev. (M=32;F=17) %	Abuse only, severe (M=8;F=7) %	Abuse only, not severe (M17;F=20) %	No drug disorder (M=249;F=311) %
ALCOHOL	M	85	75	49	39	27
	F	36	34	33	14	4
ANTISOCIAL PERSONALITY	M	68	51	42	30	8
	F	22	28	33	4	2
MAJOR DEPRESSIVE EPISODE	M	23	2	0	10	3
	F	51	14	64	18	8
DYSTHYMIA	M	4	0	38	3	2
	F	49	8	72	5	4
PHOBIA	M	21	4	52	25	5
	F	42	14	77	7	11
TOBACOO	M	75	82	28	52	32
	F	58	51	73	61	38

qualify for this diaqnosis. In men, drug dependence, but not drug abuse, is clearly related to tobacco use disorder, whether or not the dependence is severe. In women, drug abuse and dependence show equally positive relationships with tobacco use disorder.

These results show that drug disorders are strikingly related to other psychiatric disorders in young people. The relative risk for one of these disorders for men with severe dependence varies from 2.0 (dysthymia) to 8.5 (antisocial personality) times greater than for men with no drug disorder; for women the relative risk ranqed from 1.5 (tobacco use disorder) to 12.2 (dysthymia) times greater. Non-severe dependence and severe abuse also show impressive associations with these disorders, and in women even non-severe drug abuse tends to be somewhat associated with each of these disorders except dysthymia and phobia. It is noteworthv that associations are found between druq disorders and both "acting out" and "internalizing" disorders.

Table 4 shows that of all who have used some drug 5 times or more, 25% of men and 16% of women develop a drug disorder according to DSM-III criteria. This diagnosis is made on the basis of symptoms at any time, and there is no requirement that problems be long-lasting or cluster in time. Thus, the vast majority of drug users do not meet even these relatively mild diagnostic criteria. Only 8% of male users and 4% of female users developed severe dependence. Further, the likelihood of developing a drug disorder depends heavily on the age at which drug use begins. When use began before the age of 15, about half of the men and two-fifths of the women went on to meet DSM-III criteria for a drug disorder, and the longer first use was delayed, the lower became the risk of developing a disorder.

Chances of developing severe dependency appear somewhat higher for those who begin using drugs before the age of 15. Among males who developed any drug use disorder, 38% developed severe dependence if they started use before the age of 15, as compared with 27% if use began later. Among females, the comparable figures are 32% vs. 23%. However, the eventual rates of developing severe dependency among persons with late first use of drugs may be underestimated, since the later use began, the less time users have had to progress to severe drug problems. Yet, the biggest reduction in risk with deferred age of onset occurs when first use is postponed beyond age 15 to 15-17. Every user who began use between 15 and 17 had had between 1 and 20 years in which to qualify for a diagnosis.

These results confirm findings from earlier studies of young black men (Robins and Murphy 1967) that age of first use is a powerful predictor of later drug problems. The findinos suggest that delaying drug use might be useful even if entirely preventing drug use is unattainable. However, these data alone are not sufficient grounds for that conclusion. It may be that users before age 15 differed even before using drugs from those who delayed their first use. If this is the case, they might have been more vulnerable to

dependence or abuse even if they had delayed use. This issue will be explored a bit later in the paper.

TABLE 4

Age Of First Use Of Drugs And Drug Disorders
In Young St. Louis Adults

	MALES					FEMALES				
	<15	15-17	18-24	25+	Total	<15	15-17	18-24	25+	Total
N=	(46)	(126)	(141)	(19)	(332)	(33)	(131)	(163)	(43)	(370)
	%	%	%	%	%	%	%	%	%	%
DRUG DIAGNOSIS										
SEVERE DEPENDENCE	19	8	4	0	8	12	3	4	0	4
DEPENDENT,NOT SEV.	19	10	8	4	10	3	7	3	2	5
SEVERE ABUSE ONLY	10	2	1	0	2	5	2	1	3	2
ABUSE,NOT SEV.	2	6	4	7	5	19	4	5	3	5
NO DRUG DISORDER	49	75	83	89	75	61	84	87	92	84
	100	100	100	100	100	100	100	100	100	100

Since we found that the earlier use of drugs begins, the greater the risk of a drug disorder, and that drug disorders are associated with other psychiatric disorders, we wonder whether there is a direct relationship between early drug use and the manifestation of other psychiatric disorders. Table 5 presents data relevant to this issue. First, it is clear that drug use does predict these diagnoses. With few exceptions, rates are lower among non-users than among users regardless of age of first use. The relationship of age of first Drug use to disorder, however, is less clear. Prevalence of alcohol and antisocial personality disorders tend to show the same regular decrease with postponement of drug use that drug disorders did. However, for the remaining diagnoses, patterns tend to be bimodal. Highest rates are among those who begin drug use before 15 and those who begin after 25.

A possible explanation for this finding is that while drug use before 15 causes these disorders, first use of drugs in the late twenties is often an effort at self-medication in response to these disorders.

Another way of looking at the findings is to argue that first use between 15 and 24 is usually engendered by social interaction among peers, and that use during these ages is often simply a healthy adolescent's or young adult's response to peer group pressures and not an indicator of some underlying psychopathology. Initiation at other ages, either abnormally early or abnormally late, may be an indicator of psychiatric disorder. The association between age of

TABLE 5

Age Of First Drug Use As A Predictor
Of Other Diagnoses In St. Louisans Under 35

DIAGNOSES		<15 M=46 F=33 %	15-17 M=126 F=131 %	18-24 M=141 F=163 %	25-34 M=19 F=43 %	Never M=195 F=373 %
Alcohol	Men	67	42	46	23	13
	Woman	21	10	12	5	1
Antisocial Personality	Men	47	20	13	27	3
	Women	26	6	3	0	0
Major Depressive Episode	Men	9	2	5	22	2
	Women	21	14	7	25	6
Dysthymia	Men	10	0	3	16	2
	Women	20	6	5	10	4
Phobia	Men	15	6	5	29	4
	Women	36	16	6	29	10
Tobacco Use	Men	60	47	46	65	29
	Women	75	55	50	68	35

drug use and psychiatric disorder appears bimodal because initiations between ages 15-17 are most diluted by first users who do not have an underlying psychopathology.

These interpretations are uncertain because an association between psychiatric disorder could be explained either as the effect of drugs on psychiatric status or the effects of psychiatric disorders on drug use. To answer this question, we must ask whether the likelihood of drug use increases following the onset of symptoms of these disorders.

As possible precursors of drug use. we will look at early symptoms of these disorders for which we asked age of onset and also at certain factors we can assume were present prior to onset of drug use--sex, race, and broken homes. (Although we only inquired whether or not broken homes had occurred before age 15, without ascertaining age, previous research has shown that most breaks occur in the first few years of the child's life. Wadsworth (1979, table 5.1) found 33% of breaks were experienced before age 4, 58% before age 8, and 73% before age 11).

Ascertaining frequency of drug use following the onset of its possible risk factors requires determining who was at risk of becoming a drug user in each of our age brackets, and whether the risk factor of interest was present during that age bracket and prior to the time any drug use began. Those at risk of becoming a drug user for the first time were defined as the total sample minus persons who had already become drug users previous to the beginning of the age bracket of interest. To select the group at risk of drug use in whom a specific risk factor was present, we summed those who had first developed the risk factor in a previous age bracket with those who developed it for the first time in the age bracket of interest, and then removed from this group any person who began drug use at the same age or younger than the age at which the risk factor first appeared. These analyses were done with unweighted data, and the sexes were combined because of the small numbers simultaneously at risk of drug use and having already experienced the risk factor of interest. Only the three younger age brackets are compared because first use of drugs after age 25 was extremely rare and, in any case, a large proportion of our sample had not yet entered that age bracket.

Table 6 presents the relative risks for drug use in the presence *vs.* absence of 15 risk factors of drug *use* when the relative risk was high enough to suggest the factors might be causal (i.e., the percent of new users among those with the risk factor divided by the percent among those without the risk factor was 1.5 or more) or protective [i.e., the percent with new use among those with the risk factor divided by the percent among those without the risk factor was .67 or less). Where the relative risk was close to 1, the direction of the trend is indicated by a +, -, or = sign.

Most of these factors increased the risk for drug use in each age bracket. In 45 calculations, only three relative risks were not greater than 1.0, and only one, underachievement before age 15, appeared to be protective. (It may be the case that under-achievers were held back, and therefore associated with classmates younger than they and not yet involved in drugs, denying them ready access to a drug source.) Getting drunk was the most powerful precursor of drug use in every age bracket, justifying the interpretation that heavy drinking predicts drug disorders. Smoking was an important precursor only in those over 15. Indeed, most of those who began drug use before 15 were not yet smokers, although almost all of them became smokers in time.

Each of the behavior problems used as childhood criteria for antisocial personality also predicted drug abuse in every age bracket, although the impact of sexual relations and lying did not meet the 1.5 criteria in the 18-24 bracket. The loss of impact of sexual relations in the oldest bracket is explained by the fact that after age 18, having had sexual relations is modal, not deviant.

TABLE 6

15 Predictors Of Onset Of Drug Use
In Three Age Periods
(If Relative Risk >1.5 or <.67)

PRECURSORS	Relative Risk When Age at First Drug Use: <15 (79)	15-17 (257)	18-24 (304)
Drunk	5.4	2.6	2.5
School discipline	2.9	2.1	1.5
Depression	2.9	+	-
Stealing	2.3	2.1	1.8
Vandalism	2.3	1.6	1.5
Truant	2.1	2.0	1.5
Panic attack	2.1	+	=
Male	2.0	2.3	+
Arrest	2.0	1.7	1.7
Sex relations	2.0	1.5	+
Lying	1.5	1.5	+
Smoking 10/day	+	1.9	1.8
Broken home	+	+	+
White	+	+	+
Underachievement	0.5	+	+

+ = <1.5, but >1.0
- = >0.67, but <1.0
= = 1.0

Panic attacks and depressive symptoms appeared to precipitate drug use before 15, but had little effect on use between 15 and 24. (Note that this analysis does not provide information about the causal direction of the association we noted between first drug use after 24 and the diagnoses of panic disorder and depression, since we have included only the three younger age groups.) Broken homes were much less important than the child's own behavior as a predictor. Race was not an important factor.

The onsets before age 15 are characterized by more precipitating factors than are later onsets. Not only were there more relative risks above 1.5 for users under age 15, but the median magnitude of the relative risks was greater (2.0), as compared with those 15-17 (1.6) or 18-24 (1.4). However, this can be misleading. When events are very rare, as is drug use before age 15, a small percentage change can cause a large difference in relative risks. Indeed, the attributable risk (the difference between the percentage of those beginning use in the presence vs. the absence of the risk factors) is greater the later drug use begins. Thus, there is not unequivocal evidence that these factors played a larger role in precipitating onsets in younger than in older users, although they may well have.

To further help us understand whether drug use before 15 has different predictors than later use, we correlated the relative risks for the 15 predictors across age brackets. This tells us whether their relative impact changes across age brackets, regardless of whether non-users are generally more vulnerable at one age than another. We found striking correlations across age groups, but there were higher correlations between the older two age brackets (.90) than between the younger two (.60). Thus, there is some evidence that those who begin use very young have somewhat different precursors. A look at table 6 shows that it is the greater role of panic and depression in predicting drug use in the youngest group that is unique to them.

Finally, we looked at the impact of family history of antisocial behavior, alcoholism, and drug abuse as predictive factors in the various age periods. These questions about family history asked whether a parent or sibling had had a drinking problem, a drug problem, or was the "kind of person who never holds a job for long, or gets into fights, or gets into trouble with the police fromn time to time." We did not attempt to ascertain the respondent's age when these disorders first appeared in their relatives, and so we cannot be certain that the family disorders predated the respondent's own problems. However, it is of interest that antisocial behavior and alcoholism in the immediate family had an impact only on initiation of use prior to age 15. Drug use in parents was too rare to function as a predictor of children's drug use.

The development of drug problems was much less predictable than was the occurrence of first drug use. While 93% of the relative risks computed for use (table 6) had been positive and 62% greater than 1.5, relative risks for drug problems among users were positive in only 61% and greater than 1.5 in only 17%. While we had found only one relative risk for use smaller than 0.7, suggesting protection, there were four such "protective" precursors for drug problems, almost as many as "causal" ones. For no precursor was there a relative risk greater than 1.5 in every age bracket, and indeed, only one was even greater than 1.0 in every age bracket. In short, evidence that any of these factors was a predictor of drug problems was weak. Similarly, none of the three family measures (antisocial behavior, alcohol problems, or drug problems) predicted that users would develop problems. In sum, then, we can predict drug use fairly effectively, but not which users will develop problems.

The final question which we will attempt to answer is whether early drug use has become so common that it no longer has the serious implications for predicting drug disorders that it once had. To answer this question, we looked at two age cohorts: a younger cohort of persons who were under 25 at the time of interview and an older cohort of those 25 to 34. We compared the cohorts with respect to the proportions developing drug disorders among those using drugs before 18. We restricted our interest to use prior to 18 because we had found that only early drug use had

serious outcomes, and because we wanted both cohorts to have lived through the entire period of risk for beginning use.

The younger cohort was much the more likely to have initiated use of drugs before 18 (43% vs. 17%, a relative risk of 2.4). We might expect that when nearly half a birth cohort become early drug users, the early users would show fewer predisposing factors and, being less deviant initially, their use would be less prognostic of future drug disorders.

There were fewer significant precursors of use in the younger cohort.Use before 15 was predicted (relative risk greater than 1.5) by 12 of the 15 variables tested for the older cohort, compared with 9 of these variables for the younger cohort. First use between 15 and 17 in the older cohort was again predicted by 12 variables, as compared with only 4 variables for the younger cohort. Apparently, by the time the younger cohort passed their 15th birthdays, drug use had become so commonplace that it was difficult on the basis of prior behavioral history to predict who would use drugs.

When we asked whether the decreased association of drug use with prior deviant behavior in the younger cohort meant that drug use was less likely to lead to drug disorders, we also got the expected result. The proportion of the younger cohort of drug users before 18 who developed a drug use disorder was 23%, compared with 35% for the older cohort. However, this difference does not take into account the fact that the older cohort has had about 9 years more in which to develop a disorder since age 18 than has the younger cohort. The proportion of the younger cohort's users before 18 who will develop disorders may yet rise to equal the rate in the older cohort.

In any case the observed decrease in the younger cohort's liability to develop disorders if they used drugs was not sufficient to compensate for their increased rate of use. The total younger cohort, users and non-users combined, still had a substantially higher rate of drug disorders stemming from drug use before 18 than did the older cohort (10% vs. 6%).

CONCLUSIONS

A large-scale epidemiological study in three sites shows that drua disorders are most common in the youngest members of the adult community, those 18-24. Their high rates are explained simply by the rise in drug use in this generation, not by an increased vulnerability to addiction or abuse among users. Sex, race and education are only weakly related to drug disorders, with slightly higher rates for males, whites, and inner-city residents. For both men and women, drug use disorders are associated with other adult disorders: tobacco use disorders, alcoholism, antisocial personality, depression, and phobia.

Beginning drug use before age 15 predicted an increased risk of drug disorders, particularly of a severe type. Early onset of use was also associated with more alcoholism and antisocial personality. Other diagnoses were more common if drug onset was either unusually early or unusually late.

When early indicators of alcohol problems, heavy tobacco use, antisocial behavior, depression, and anxiety occurred in non-users of drugs, the risk of drug use was increased, particularly if these precursors appeared before age 15. Broken homes and race had little or no predictive power, while having antisocial and alcoholic close relatives was associated with onset of drug use before age 15 but not later.

None of the factors found to predict drug use was useful in predicting progression from use to problem use in persons using some drug at least five times. Thus, we remain at a loss for ways to identify drug users who are at high risk of becoming problem users, except by early age of onset.

The youngest cohort, those below age 25 at interview, had more and earlier use of drugs. They required fewer precursors to become users and users among them were somewhat less likely to develop drug disorders than were users from the older cohort. However, the latter finding is only tentatively true, since users from the younger cohort have had fewer years at risk of developing a disorder. In any case, their relative immunity to developing problems with drugs was not sufficient to compensate for the great increase in proportion of early users in this young group.

These findings suggest that a useful preventive strategy would be to try to postpone first drug use to age 18 or later.

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Developmental Patterns of the Use of Legal, Illegal, and Medically Prescribed Psychotropic Drugs from Adolescence to Young Adulthood

Denise B. Kandel, Ph.D., and Kazuo Yamaguchi, Ph.D.

INTRODUCTION

The development of appropriate preventive programs aimed at reducing drug abuse in the general population depends upon understanding two aspects of the phenomenology of drug involvement: (1) the natural history of the use of various drugs. ranging from first experimentation, to use, to disuse; and (2) the factors that predict initiation and movement into the various phases of use for each drug. The first provides guidelines regarding when In the life cycle and for which substance it is most profitable to intervene. The second provides guidelines regarding which preventive strategies would be most effective. Both help identify the populations that should be the target of the interyentions. In this chapter, we address the first of these two issu in detail and the second one more briefly by drawing on the findings from a longitudinal followup we have carried out on a cohort of former adolescents into their early years of adulthood, at age 25.

While repeated cross-sectional surveys of the population have provided extensive data on age-related patterns of drug use, relatively little is known developmentally about the drug experiences of the same individuals over time. The most important trends to emerge from cross-sectional epidemiological surveys are the onset of experimentation with legal and illegal drugs in early adolescence, the apparent peaking in the use of illicit drugs during the years 18 to 22. and the increase in medical prescriptions of psychoactive drugs in the middle twenties (e.g.,Fishburne et al. 1980; Miller et al . 1983; Kandel 1980a).

However, in a cross-sectional survey, age comparisons are based on members of different cohorts and, therefore, confound two possible processes: maturational changes associated with chronological age and historical differences among cohorts with different life experiences, such as different drug experiences in adolescence that would carry into adulthood. Because of rapid changes in the prevalence of illicit drug use over the past fifteen years, the lower observed

rates of use of these drugs among persons in their late twenties may reflect fewer lifetime opportunities for use as well as a maturational decline of use with increasing age.

In order to identify possible maturational trends, the same individuals need to be tracked over time and their behavior monitored. The optimum design is a cohort sequential design, with multiple cohorts sampled so as potentially to separate historical/cohort factors from maturational trends, although even in such a design the effects of historical factors cannot be completely eliminated. Such studies are extremely complex and costly. The only one implemented so far is Monitoring the Future, the national study of high school seniors conducted by Johnston et al. (1982). Besides Johnston's contribution in this volume, one other known longitudinal report on patterns of drug use from adolescence through young adulthood is Johnston's (1973) earlier followup of a national male cohort from the sophomore year in high school to age 24 in 1974. Patterns of drug use at three specific points in time were described: the junior year in high school, the senior year in high school, and at age 24. Most other dynamic descriptions of drug behavior over time cover a segment of the lifespan in that interval, either in adolescence (e.g., Kandel 1975; Adler and Kandel 1983; Brunswick and Boyle 1979 ; Jessor and Jessor 1977; Kandel et al. 1976a) or early adulthood (Robins 1974).

The natural history of drug involvement through age 25 in a general population sample is the focus of this chapter, in which four issues are addressed:

1. What are the periods of risk for initiation, stabilization, and decline in the use of various drugs including legal, illicit and medically prescribed psychoactive drugs from early adolescence to the midtwenties?

2. Are there patterns of sequential progression in drug involvement from adolescence to early adulthood?

3. Does the use of certain drugs lower in the sequence influence subsequent initiation of drugs higher in the sequence?

4. What are the implications of these results for prevention?

THE DATA

The data are derived from a followup carried out in 1980-81 of a cohort of young adults, representative of adolescents formerly enrolled in grades 10 and 11 in public secondary schools in New York State in 1971-72. The original high school sample was a random sample of the adolescent population attending public secondary schools in New York State in Fall 1971, with students selected from a stratified sample of 18 high schools throughout the State. The target population for the followup was drawn from the enrollment list of half the homerooms from grades 10 and 11, with homerooms having high marijuana use sampled at twice the rate of the others.

Students who had not participated either in the Fall or Spring waves of the initial study, and who presumably were chronic absentees[1], were also selected for inclusion and sampled at a lower rate to permit unbiased estimates of the former student population at the time of the adult followup. With a completion rate of 81%, 1,325 persons of those living were interviewed, at a mean age of 24.7 years.[2]

Structured personal interviews took an average of 2 hours to administer. The interview schedule consisted almost exclusively of structured items with closed-end response alternatives. An unusual component of the schedule consisted of two charts designed to reconstruct on a monthly basis the respondents' life and drug histories (figure 1). Information was collected on the histories of use of twelve drugs or drug classes: two legal (cigarettes and alcohol), four illegal (marijuana, psychedelics, cocaine, and heroin), and medical and non-medical use of six classes of psychotropic drugs (methadone, minor and major tranquilizers, sedatives, stimulants, antidepressants, and opiates other than heroin). Colored pill charts developed for general population surveys (Fishburne et al. 1980) were displayed to respondents to increase the accuracy of reports about use of minor tranquilizers, sedatives, and stimulants. While age of onset was ascertained for all users of each drug, the detailed retrospective drug histories, including periods of highest use, were obtained only for drugs used a minimum of 10 times. Specific dates of onset of use were ascertained separately for beer, wine, and distilled spirits, but periods of use for alcoholic beverages did not distinguish among them in order to reduce respondents' burden. Chronological time lines specifying years and months recorded the timing of the use of the different drugs.

It is important to note that the data on which the analyses are based clearly have (at least) two limitations: (1) the data come from a single cohort and cannot effectively distinguish age effects from period effects, and (2) the data are based on retrospective reports and are subject to various distortions, such as telescoping of recall.[3] These limitations must be kept in mind in the interpretations of the results.

PATTERNS OF DRUG USE FROM ADOLESCENCE TO YOUNG ADULTHOOD: RISK AND USAGE PERIODS

The detailed retrospective reports on the use of various drugs obtained from the drug histories make it possible to describe patterns of initiation, stabilization, and decline in drug use in this longitudinal cohort of young adult men and women. The contrast among the various classes of drugs is especially illuminating.

Overall Prevalence of Drug Use in the Young Adult Cohort

Before examining patterns of drug use over time, it is useful to consider the overall lifetime prevalence of the use of various drugs in the cohort at the time of the followup interview. The lifetime prevalences of the use of the legal and illegal drugs, and the use

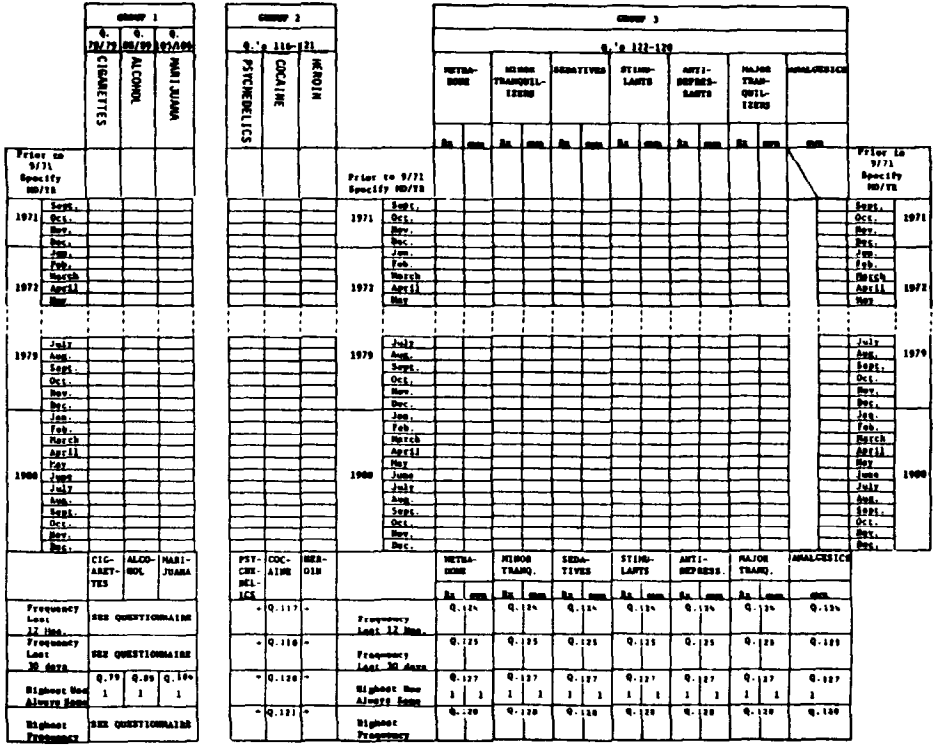

FIGURE 1

DRUG HISTORY CHART

of nonprescribed and prescribed psychoactive substances are displayed in table 1.

TABLE 1

Lifetime Prevalence of Legal, Illegal and Medically Prescribed Psychoactive Drugs in New York State Young Adult Cohort at Age 24.7 (1980)

	Proportions Who Ever Used			
	By Followup			By Age 18
	Males	Females	Total	Total
Alcohol (beer, wine or distilled spirits)	99	98	99	95
Cigarettes	80	79	79	68
Marijuana	77	68	72	54
Psychedelics	31	20	25	18
Cocaine	37	23	30	8
Heroin	5	1	3	1
Non-prescribed:				
Methadone	1.0	0.1	0.5	0.1
Minor tranquilizers		15	17	7
Sedatives	23	15	19	10
Stimulants	28	18	23	10
Major tranquilizers	3	0.4	2	0.7
Antidepressants	1	0.5	0.8	0.1
Prescribed:				
Methadone	2	0.3	1	0.5
Minor tranquilizers	19	28	24	7
Sedatives	9	6	8	2
Stimulants	3	9	7	2
Major tranquilizers	2	2	2	0.9
Antidepressants	1	3	2	0.8
Total N	(706)	(619)	(1,325)	(1,325)

Source: Kandel and Logan 1984. Copyright 1984, American Public Health Association.

The lifetime prevalences of the use of different drugs in this cohort replicate epidemiological findings from other surveys (e.g. Johnston et al. 1982; Miller et al. 1983). The most prevalent drugs are the legal drugs, alcohol (99%) and cigarettes (79%). Marijuana is the most prevalent illicit drug, having been used by 72% of the cohort. Next in prevalence among the illicit drugs are cocaine (30%) and the psychedelics (25%). Among the medically prescribed drugs, the minor tranquilizers (24%) are most prevalent. As is typical of general population samples, only a small minority (3%) report ever having used heroin. Male use of most drugs is consistently higher than female use, but women have higher use of prescribed minor tranquilizers and stimulants.

Periods of Risk for Initiation into Various Drugs

The continuous observations obtained retrospectively on the use of these drugs up to the time of the followup interview make it possible to examine drug behavior as a dynamic process through life table analysis.

In these dynamic analyses, hazard functions estimate the rate of occurrence of a particular event within a specific period among those estimated not to have undergone the event *during* the interval. The hazard function is a measure of the increase in lifetime prevalence relative to the size of the group exposed to risk. As applied to drug histories, the hazard function estimates the incidence of drug use during the period, i.e., the proportion of persons among those who have not used a particular drug during the time interval who begin the use of that drug in that interval. In our analyses, the time interval was defined to be 12 months.

An age-specific risk factor differentiates the interval in which it operates both from prior and subsequent periods. A transition between periods characterized by a smooth progression, such as a systematic increase or decrease in the hazard rates, would be attributed to an accelerated incremental or decremental maturational process. On the other hand, a substantial degree of discontinuity in the curve would be attributed to an age-specific risk factor. A maximum point in the function during the period under observation is interpreted as a developmental process in which risk increases with exposure and maturation occurs after a certain point in time. Maturation accounts for reversals in the trends of hazard function.

Hazard rates through age 25 for alcohol, cigarettes, and three illicit drugs (marijuana, psychedelics, and cocaine) are displayed in figure 2. To simplify the presentation, the rates are displayed for the total cohort, since overall patterns for men and women follow the same configurations. Differences will be briefly discussed later. Specific hazard rates by age and sex for each drug class are displayed in table 2. Only highlights are discussed below.

The rates of initiation into cigarettes, alcohol, and marijuana increase through age 18 and thendecline sharply. Some differences appear among the drugs. The risk for initiation shows sharper peaks for alcohol and for marijuana, and a longer and less differentiated period lasting from age 16 to 18 for cigarettes.

Alcohol use begins early in life, with almost 20% of the cohort having ever used alcohol by age 10 and over 50% by age 14. The rate of initiation begins to increase about age 10, jumps at age 12, and continues to increase until age 18; initiation after age 18 occurs at much reduced rates. Although the rate of initiation is low up to age 12, the cumulation of the low rate over 12 years means a substantial initiation of children into drinking by age 12.[4]

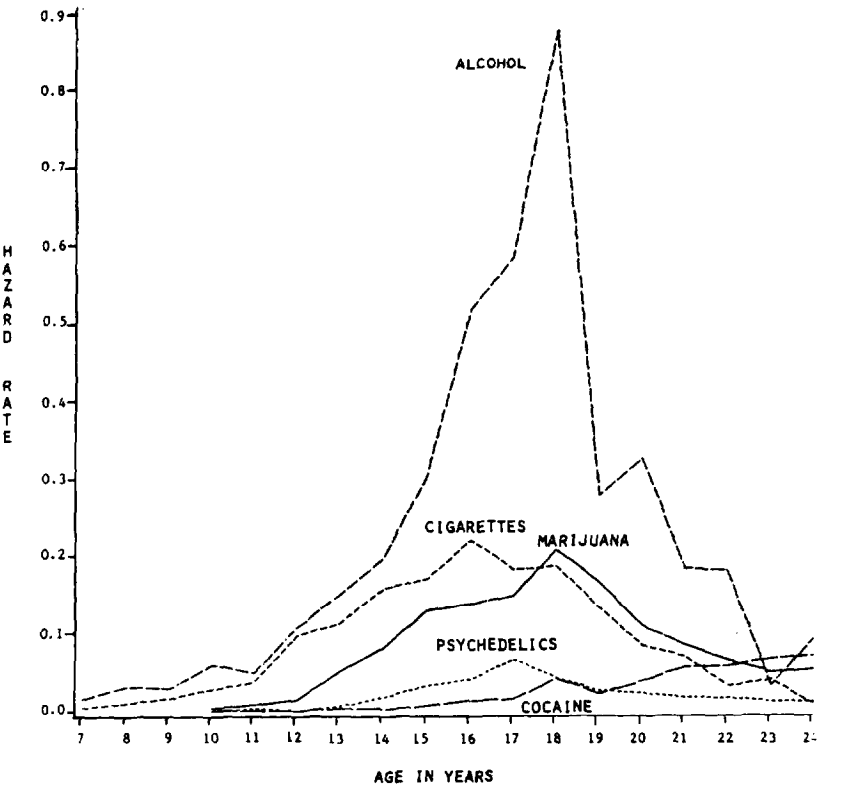

FIGURE 2

HAZARD RATES BY AGE FOR ALCOHOL, CIGARETTES, MARIJUANA, PSYCHEDELICS, AND COCAINE

Source: Kandel and Logan 1984. Copyright 1984, American Public Health Association.

The rate of initiation for cigarettes shows a strong increase at age 12. Although this rate is at first similar to that for alcohol, it does not show the steep rise at age 15 or as sharp a decrease at age 18. Rather, the rate peaks at about .22 at age 16, declines to .18 at ages 17 and 18, and falls to .13 at age 19, with a further decline at age 20.

The rate of initiation for marijuana begins to climb at about age 13 (from .05) and reaches a peak of .20 at age 18, with the sharpest dropoff occurring between ages 19 and 20 (from .16 to .11). Marijuana shows a higher residual rate of initiation at ages 23 and 24 (.05) than either alcohol or cigarettes.

The pattern for psychedelics follows that for marijuana but the pattern for cocaine is quite different. Psychedelics exhibit a beginning rise at age 14 and a peak of .06 at age 17; thereafter, the decline is fairly rapid, falling below .01 by age 23. The end of the major period of risk is at age 18. Cocaine is the only illicit drug that shows continuing increases in the risk of initiation

TABLE 2

Hazard Rates, Ages 7-24, For Initiation of Use of Alcohol, Cigarettes, Marijuana, Other Illicit Drugs, Prescribed Psychoactive Drugs and Non-Prescribed and Prescribed Use of Minor Tranquilizers

	ALCOHOL		CIGARETTES		MARIJUANA		OTHER Illicit DRUGS[a]		PRESCRIBED DRUGS[b]		MINOR TRANQ. OWN USE		MINOR TRANQ. PRESCRIBED	
Age		Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
7	.015	.015	.004	.003	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
8	.047	.018	.018	.004	.0	.0	.0	.0	.002	.002	.0	.0	.0	.002
9	.035	.024	.025	.008	.002	.0	.0	.0	.0	.0	.0	.0	.0	.0
10	.078	.044	.038	.020	.004	.003	.0	.0	.0	.002	.0	.0	.0	.002
11	.073	.030	.041	.034	.013	.004	.010	.0	.0	.004	.0	.0	.0	.004
12	.167	.064	.096	.098	.013	.015	.0	.002	.006	.004	.0	.0	.0	.002
13	.177	.129	.111	.114	.056	.045	.012	.013	.005	.007	.005	.0	.003	.003
14	.268	.149	.142	.168	.101	.065	.029	.024	.006	.005	.004	.003	.001	.004
15	.305	.293	.166	.157	.148	.112	.039	.042	.008	.014	.010	.006	.007	.011
16	.541	.497	.207	.225	.166	.113	.078	.056	.008	.027	.017	.016	.006	.022
17	.644	.544	.184	.178	.191	.115	.097	.060	.010	.020	.019	.008	.006	.014
18	1.004	.813	.172	.195	.219	.196	.093	.054	.030	.034	.039	.015	.026	.025
19	.143	.380	.122	.139	.191	.145	.052	.036	.037	.040	.021	.015	.021	.033
20	.182	.394	.079	.083	.111	.104	..055	.044	.021	.040	.013	.023	.014	.036
21	.266	.132	.071	.062	.097	.072	.061	.025	.038	.035	.014	.019	.027	.028
22	.207	.160	.044	.016	.052	.068	.074	.034	.035	.047	.009	.018	.027	.037
23	.087	.0	.044	.029	.057	.038	.055	.063	.044	.088	.026	.023	.037	.069
24	.0	.138	.006	.0	.026	.064	.080	.048	.055	.079	.015	.023	.042	.048

[a]Includes heroin. cocaine. psychedelics, and use on on of major tranquilizers, anti-depressants, stimulants. sedatives, minor tranquilizers. and methadone.

[b]lncludes minor tranquilizers, sedatives and stimulants.

through the period of the lifespan covered by the followup, probably reflecting historical trends. (See also Brunswick and Boyle 1979.)

Hazard rates for prescribed and non-medical use of psychoactive substances, the minor tranquilizers, the sedatives and the stimulants, are displayed in figure 3. Starting with lower rates of initiation than those observed for the non-medical use of these drugs, rates for prescribed use continue to rise through the period of observation. Between ages 20 and 21, rates of initiation to prescribed use are higher than to non-prescribed use. The rates of initiation to prescribed use at age 23 are almost twice (1.75) those observed at age 22.

Table 3 indicates the age by which 90% of the users of each drug had initiated use. Initiation to alcohol is almost completed by age 18, to cigarettes by age 19, to marijuana by age 20 and to psychedelics by age 21. In this cohort, the risk of initiation into marijuana smoking for those who have not done so by age 20 is very small.

TABLE 3

Age by Which 90% of Users of Each Drug Have Been Initiated Into the Drug

Drug	Age	Total users
Alcohol	18	(1,305)
Cigarettes	19	(1,049)
Marijuana	20	(955)
Psychedelics	21	(335)
Cocaine	24	(392)
Minor Tranquilizers - Own use	23	(216)
Sedatives - Own use	23	(245)
Minor Tranquilizers - Prescribed use	24	(311)
Sedatives - Prescribed use	23	(100)

Patterns of initiation of licit and illicit drugs are very similar for men and for women, although males initiate use at higher rates and continue to increase use at faster rates than females. Illustrative data for marijuana are presented in figure 4.

By contrast, females show consistently higher rates of initiation to the prescribed psychoactive substances than males, with the differences statistically significant.

Periods of Stabilization and Decline in Marijuana Usage

After initiation, use of a drug may or may not persist. Use in any monthly period during the retrospective period was examined for five classes of drugs, for men and women separately: (1) cigarettes; (2) alcohol; (3) marijuana; (4) other illicit drugs (including psychedelics, cocaine, heroin, non-prescribed use of minor tranquilizers,

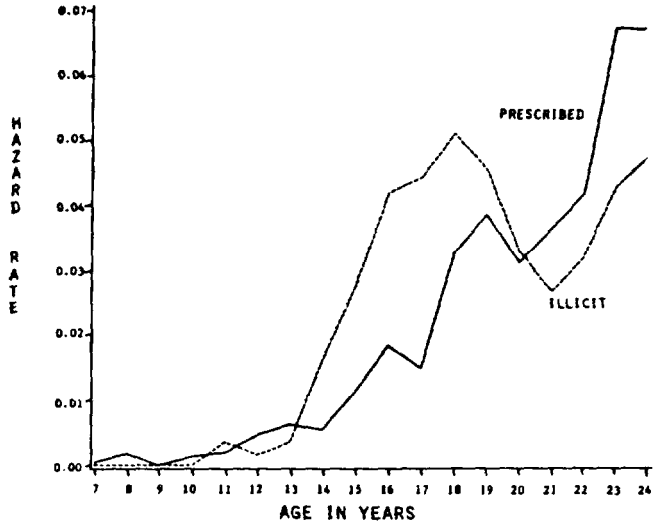

FIGURE 3

HAZARD RATES (INITIATION) BY AGE FOR ILLICIT AND PRESCRIBED PSYCHOACTIVES: MINOR TRANQUILIZERS, SEDATIVES AND STIMULANTS

Source: Kandel and Logan 1984. Copyright 1984, American Public Health Association.

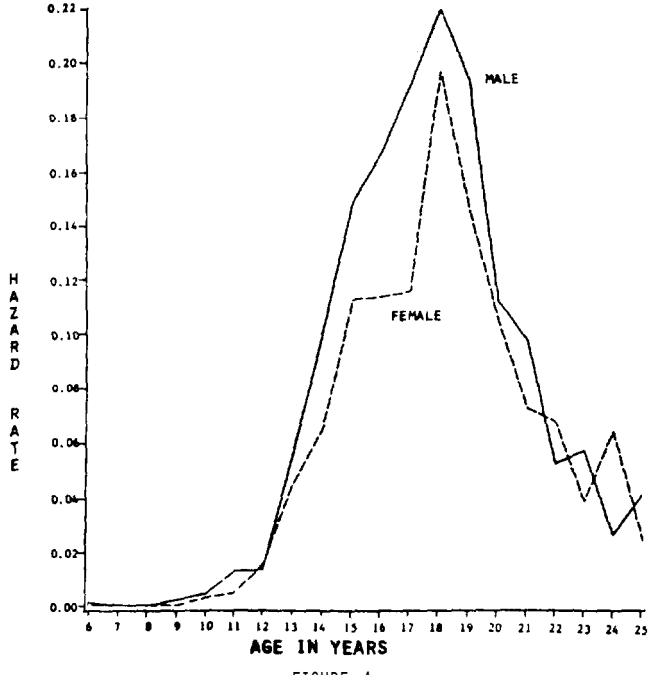

FIGURE 4

HAZARD RATE FOR MARIJUANA BY SEX AND AGE

sedatives, and stimulants); and (5) medically prescribed psychoactive drugs.

Alcohol use stabilizes about midway through the nineteenth year, where monthly male use is 90% and female use is 82% (figure 5). During the period of stability following age 19, there is a slight gain in use by females, but not for males. Between ages 23 and 24, there is a slight decline in use for men and women: about 2% for males and 6% for females. Use in a given month at age 24 is about 90% for males and 82% for females.

Quarterly averages of monthly use show similar patterns for alcohol and marijuana. The marijuana patterns, for men and women separately, are displayed in figure 6. Marijuana usage parallels initiation by increasing sharply from the pre-teens to age 18. Usage stabilizes through ages 23-24, when a decline appears to occur. The overall shape of the curves are identical for men and women, although at each age women have lower rates of usage than men. The early twenties are a period of very active use of marijuana when 50% of the males and approximately 33% of the females reported using the drug in any month in that period.

The pattern for cigarettes contrasts with that observed for marijuana and alcohol (figure 7). Rather than declining, rates of cigarette smoking remain stationary beginning at ages 18 or 19. The quarterly average use at age 24 is 47% among males, 43% among females.

Use of illicit drugs other than marijuana begins around age 14 for men and women and continues to rise until the end of the period of observation (figure 8). Usage is higher among males than females: about 12% at age 18 among males, and 5% among females. By age 24, use is about 18% and 8%, respectively.

Female use of prescribed psychoactive drugs (figure 8) continues to rise slightly during young adulthood, while use stabilizes among males. This usage rate is low (.02-.04) and contrasts with the higher cumulative levels of initiation. By age 23, the proportion of those who have ever used one of the drugs by prescription and who are still currently using is approximately 13%, compared with 25% for other illicit drugs, 60% for marijuana and cigarettes, and 90% for alcohol. There is less persistence of use of the prescribed drugs after initiation, which is consonant with the goal of time-limited prescriptions.

Periods of Highest Drug Use

A maturational trend in marijuana and alcohol use in this cohort appears more clearly when periods of highest use rather than use per se are examined from adolescence to young adulthood (figure 9). For both alcohol and marijuana, periods of highest use decline sharply after age 20 or 21. The contrast with cigarettes, where rates rise through the end of the period of observation, is striking.

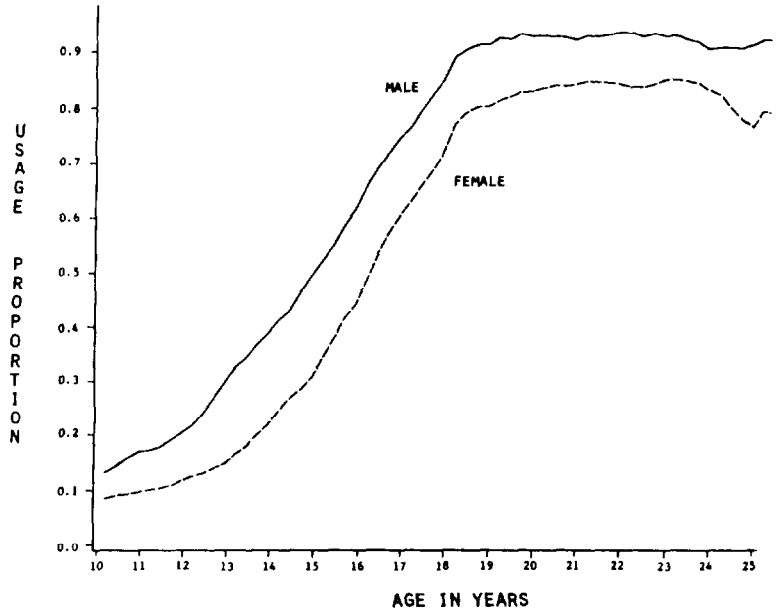

FIGURE 5
USAGE OF ALCOHOL BY SEX AND AGE

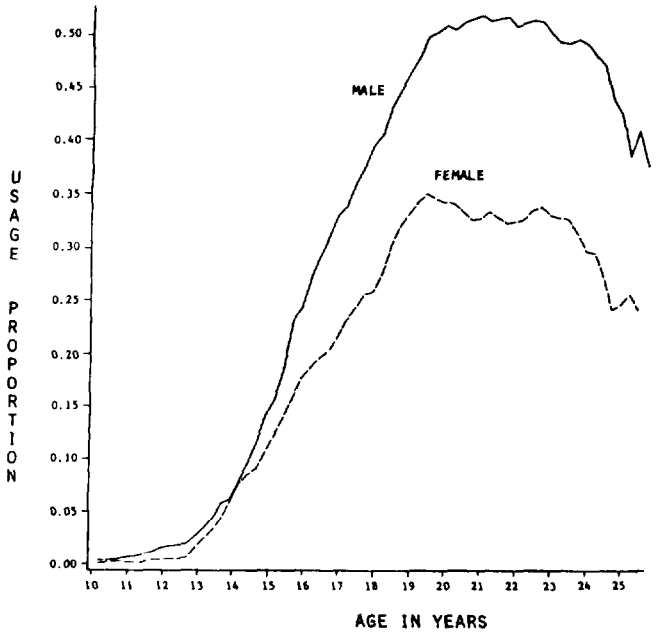

FIGURE 6
USAGE OF MARIJUANA BY SEX AND AGE

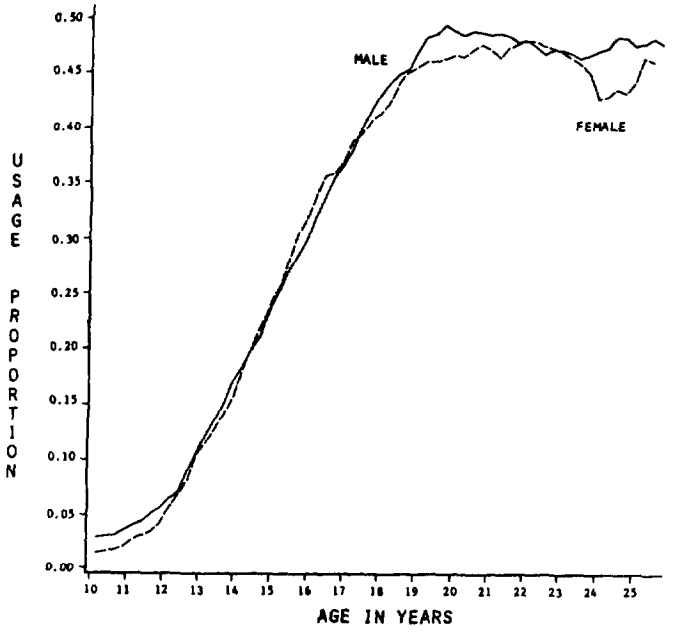

FIGURE 7
USAGE OF CIGARETTES BY SEX AND AGE

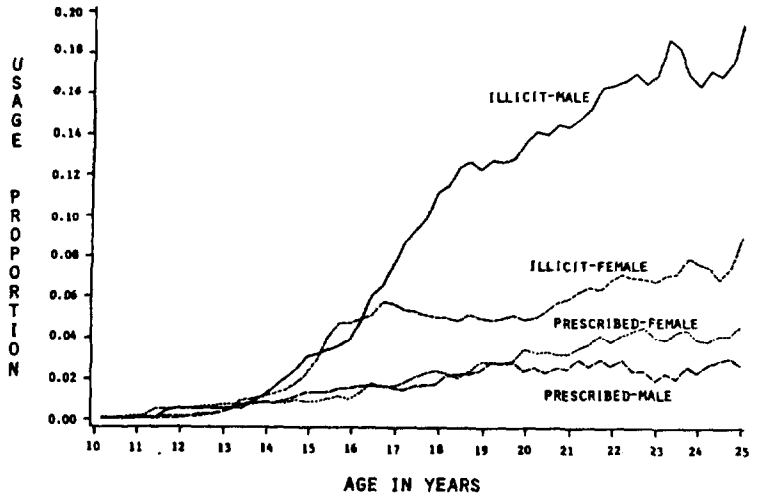

FIGURE 8
USAGE BY SEX AND AGE OF
OTHER ILLICIT AND PRESCRIBED PSYCHOACTIVE DRUGS
Source: Kandel and Logan 1984. Copyright 1984, American Public Health Association

The data suggest that there is a maturational process going on for marijuana and alcohol that is not observed for cigarettes. Periods of highest use for alcohol and marijuana occur over a narrower age span than periods of use per se (although the period lasts longer for alcohol than for marijuana), and occur about a year later for males than for females. Thus, for alcohol, highest usage peaks at around ages 19-20 for males, and ages 18-19 for females.

For the individuals involved, the periods of highest use represent periods of heavy drug involvement. During their period of most intensive consumption, 51% of the alcohol users reported drinking alcohol at least four times a week (24% daily), and 50% reported drinking an average of five drinks on a drinking day. In their period of highest use, 50% of the marijuana users were using marijuana at least four times a week (30% daily), 56% were smoking two to three joints on an average day when they used it. Among smokers of tobacco cigarettes, 87% were smoking daily, an average of one pack or more per day.

SEQUENCES OF PROGRESSION

The analyses so far have examined each class of drug by itself. Yet, we know from prior work that the use of various drugs is interrelated, and, more importantly, that a sequential pattern of involvement in drugs exists in adolescence. Adolescents are very unlikely to experiment with marijuana without prior experimentation with alcohol or cigarettes; very few try illicit drugs other than marijuana without prior use of marijuana (Kandel 1975). This pattern has been observed not only in the United States, but in France and Israel as well (Adler and Kandel 1981). More recently, Donovan and Jessor (1983) have suggested that problem drinking intervenes between marijuana and other illicit drugs. To date, the strongest empirical support for the concept of stages in drug use is derived from cross-sectional analyses based on Guttman scaling and a short-term longitudinal followup that we carried out in adolescence. Cross-sectional analyses have relied mostly on Guttman scaling to establish a clear cumulative order (Donovan and Jessor 1983; Brook et al. 1982; Single et al. 1974) or on self-reported ages of onset for various drugs (Johnston 1973; O'Donnell et al. 1976; O'Donnell 1979a, 1979b; O'Donnell and Clayton 1982). A comparison of two latent causal models representing a simplex stage model and a common factor model confirms the fit of the cumulative model to drug use data (Huba and Bentler 1982, 1983; Martin 1982). The longitudinal evidence is based on a followup of high school students carried out over a school year. Inferences were made about developmental stages in drug behavior in adolescence by extrapolating from the behavior of adolescents with different drug using patterns over a 5- to 6-month interval and constructing a synthetic cohort (Kandel 1975, 1980a; Kandel and Faust 1975). Additional evidence appears in the work of Goldstein et al. 1975; Gove et al. 1979; Miller et al. 1983; and Sinnett et al. 1972. No results have been reported that are based on a followup of young people over several years with a detailed monitoring of their drug behavior past the period of risk for initiation into the relevant drugs. Such data are reported here.

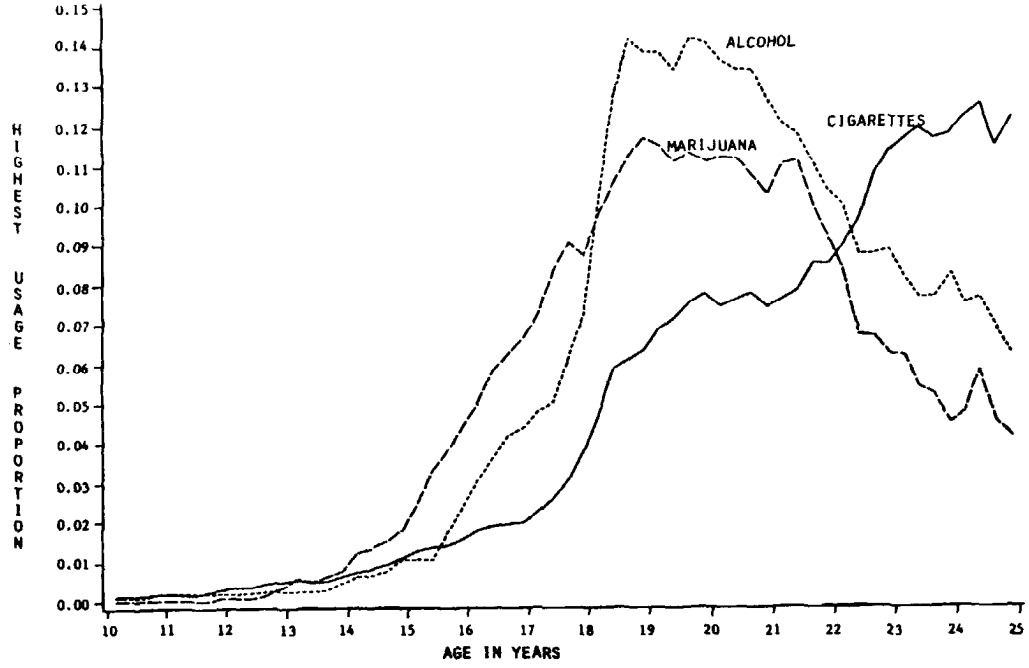

FIGURE 9

PERIODS OF HIGHEST USE FOR ALCOHOL, CIGARETTES AND MARIJUANA BY AGE
AS A PROPORTION OF ALL USERS

Source: Kandel and Logan 1984.

In extending the analyses into young adulthood, we were interested in establishing: (1) whether the pattern of progression observed in adolescence over a short-term interval, from the use of at least one class of licit drug (alcohol or cigarettes) to the use of marijuana to the use of other illicit drugs, holds when the same individuals are followed to young adulthood; and (2) whether the use of medically prescribed psychotropic drugs can be characterized as a later stage of progression.

Analytical Strategies: Modified Guttman Scaling

Five drug classes were distinguished, as described above. Analyses of progression were based on the year and month of onset ascertained for each drug used lifetime 10 or more times. The earliest drug used within a class of drugs determined the age of onset for that class. Major pathways of progression were identified from the ordering of initiation among the five classes of drugs. Specific cumulative progression models or scale types were hypothesized and tested for fit to the data. The models tested were derived from our earlier work and from examining the ordering of initiation among the five classes of drugs in this cohort.

A modification of Guttman scaling was applied to these longitudinal data to ascertain the proportions of the sample falling in each specified scale type or model of progression. A specific cumulative order was hypothesized to represent a particular type of sequence (or scale), and the proportion of persons classified in the scale type beyond that expected from the marginals was estimated. In contrast to traditional Guttman scaling, the temporal order of events rather than the cross-sectional cumulative feature of attributes was analyzed, and statistical procedures were developed to identify the efficiency of various cumulative models in fittino the data. For a given model of stages of progression, the observed proportion of individuals who could be classified in the scale tvoe was calculated, although, as in Guttman scaling, not all individuals were required to reach the highest stage in the progression.

In testing the fit of a model of progression, it is important to ascertain not only the observed proportion of individuals who fall in the scale type but also the expected proportion that is not due to chance. (For a technical discussion, see the appendix in Yamaguchi and Kandel 1984a.) The maximum likelihood estimates of six parameters is obtained for a given specification of scale and non-scale types, given the assumption that the non-scale type can occur only by chance. One parameter, C, is a constant representing the total frequency of persons whose pattern of progression, which may or may not end in the scale type, occurs by chance, i.e., the random type group; the other five parameters, r_i, r_j, r_k, r_l and rm, represent the marainal orobabilities of initiation for each class of drugs among persons 'in the random type group. The expected proportion of persons in the scale type occurring not by chance is given by (N-C)/N, where N is the sample size. The likelihood ratio chi-square statistic (X_{LR}) associated with maximum likelihood estimation, the observed proportion of persons in the scale type, and the expected proportion of persons in the scale type not by chance are

used to assess the goodness of fit of the models of stages of progression.

Independence of Initiation into Different Drugs

The expected distribution of the number of different drugs used, assuming independence, was calculated from the observed proportions of persons who had used each class of drugs at least 10 times in their lives.[5] The ratio of observed to expected frequencies establish a clear pattern of deviation from independence of initiation. The numbers of persons who never used any of the drugs in their lives and who used all five classes of drugs are five to nine times higher than expected. Users of one class of drugs and of four classes are 1.3 to 1.8 times higher than expected, while users of two or three classes of drugs are 0.7 to 0.8 times less frequent than expected. Persons who use a particular drug are also likely to initiate use of other drugs.

Steps of Progression

Based upon the earlier work on adolescents (Kandel 1975, 1980b; Kandel and Faust 1975) and the analyses described above on time of onset of various drugs from adolescence to young adulthood, the following basic sequence of progression was tested: alcohol, cigarettes, marijuana, other illicit drugs, and prescribed psychoactive drugs. In order to substantiate this hypothesized sequential model and to uncover major additional steps of progression through patterns that did not fit this basic sequence, the proportions of persons in the more frequent pattern of transition for each pair of drugs were calculated. These proportions were calculated separately for cases where at least one class of drugs in the pair was used, and cases where both classes of drugs in the pair were used. The latter identify the ordering propensity with no confounding of differences in probabilities of occurrence (table 4).

Except for three pairs (alcohol and cigarettes, cigarettes and marijuana, and other illicit drugs and prescribed psychoactive drugs), each drug in a pair precedes the other in more than 85% of the cases for men and women (columns 1 and 2). The ordering among those who used both drugs in a pair is not greatly different from that observed among those who used either one or two drugs, although the proportions are lower (columns 3 and 4).

Tests of Specific Sequential Models

To identify stages of progression beyond pairwise comparisons of two events, the modified Guttman scale analysis of stages described above was carried out. Model I is the baseline model and assumes independence and no ordering. Hierarchical tests were carried out on a basic model of progression and three variants based on observed deviant patterns.

Model Q, the first model to be tested, was suggested by the results on pairwise ordering presented in table 4. The hypothesized sequence reflects unidirectional pairwise orderings with transitions

TABLE 4

Pairwise Comparisons of the Order of Initiation Among Five Classes of Drugs Used 10 Times or More

Drug Used Earlier	Drug Used Later	Relative Proportion of Specified Ordering[a]: Among persons who used at least one class of drugs: Male	Among persons who used at least one class of drugs: Female	Among persons who used both classes of drugs: Male	Among persons who used both classes of drugs: Female
Alcohol	Cigarettes	.80	.70	.70	.55
Alcohol	Marijuana	.92	.90	.88	.83
Alcohol	Other illicit drugs	.99	.98	.95	.93
Alcohol	Prescribed psychoactive drugs	.99	.98	.92	.90
Cigarettes	Marijuana	.60	.70	.67	.72
Cigarettes	Other illicit drugs	.89	.94	.86	.91
Cigarettes	Prescribed psychoactive drugs	.95	.91	.85	.84
Marijuana	Other illicit drugs	.98	.94	.95	.87
Marijuana	Prescribed psychoactive drugs	.95	.87	.80	.75
Other illicit drugs	Prescribed psychoactive drugs	.82	.56	.69	.53

[a] $f(i,j)/(f(i,j) + f(j,i))$ where $f(i,j)$ is the frequency of cases where class i precedes class j. $f(i,j)$ in Columns 1 and 2 includes persons who used only drug i.

Source: Yamaguchi and Handel 1984a. Copyright 1984, American Public Health Association.

over 85% when at least one drug in the past has been used (or 80% when both have been used). No clear ordering was hypothesized between the uses of alcohol and tobacco cigarettes and marijuana, and of other illicit drugs and prescribed psychoactive drugs.

Model Q is defined as follows:

Model Q:
- Alcohol precedes marijuana;
- Alcohol, cigarettes, and marijuana precede other illicit drugs; and
- Alcohol, cigarettes, and marijuana also precede prescribed psychoactive drugs.

Model Q fits the data for 82% of the men (76% not by chance) and 79% of the women (68% not by chance).

Three deviant patterns of progression relatively more frequent than others involve modifications in the role of a legal drug in drug

progression, and were suggested by the transition between drugs involving fewer than 85% (or 80%) of the users of any pair of drugs. These modifications weaken the original model, as specified below.

Condition A: Use of cigarettes does not have to precede the use of other illicit drugs.

Model QA:
- Alcohol precedes marijuana;
- Alcohol and marijuana precede other illicit drugs; and
- Alcohol, cigarettes, and marijuana precede prescribed psychoactive drugs.

Condition B: If the use of cigarettes precedes the use of marijuana, the use of alcohol does not have to precede the use of marijuana.

Model QB:
- Either alcohol or cigarettes precedes marijuana;
- Alcohol, cigarettes, and marijuana precede other illicit drugs; and
- Alcohol, cigarettes, and marijuana also precede prescribed psychoactive drugs.

Condition C: The uses of alcohol and either cigarettes or marijuana, but not both, may precede the use of prescribed psychoactive drugs.

Model QC:
- Alcohol precedes marijuana;
- Alcohol, cigarettes, and marijuana precede other illicit drugs; and
- Alcohol and either cigarettes or marijuana precede prescribed psychoactive drugs.

These conditions can also be combined.

Tests of comparisons between pairs of hierarchical models were made (see Yamaguchi and Kandel 1984a). Although all models apparently fit the data well, the tests of goodness of fit are not reliable (except for tests comparing any two hierarchical models) because there are many zero observations in the error-type patterns of progression implied by each model.

Among men, Model QA, which hypothesizes that cigarettes do not have to precede other illicit drugs, improves Model Q substantially, while modifications represented by Models QAB or QAC do not. Model QA, which classifies most parsimoniously 87% of the men (82% not by chance), characterizes patterns of drug progression among men.

Among women, conditions B and C, rather than condition A, improve the fit of Model Q. Model QB improves the fit of Model Q most significantly in terms of the chi-square test and the increase in the proportion of persons in the scale type not by chance. Model QBC, described below, further improves slightly the fit of Model QB and most parsimoniously characterizes the pattern of drug progression

among women. The model fits the data for 86% of the women (77% not by chance).

Model QBC:
- Either alcohol or cigarettes precedes marijuana;
- Alcohol, cigarettes, and marijuana precede other illicit drugs; and
- Alcohol and either cigarettes or marijuana precede prescribed psychoactive drugs.

There are clear temporal developmental stages in the use of licit and illicit drugs from adolescence through young adulthood, when the period of risk for initiation into drugs other than the prescribed psychoactive drugs terminates.

These findings advance our understanding of sequential patterns of drug involvement beyond that gained from earlier analyses carried out in adolescence. The sequence of involvement into drugs progresses from the use of at least one legal drug, alcohol and/or cigarettes, to marijuana; and from marijuana to other illicit drugs and/or to prescribed psychoactive drugs. While the patterns described during adolescence hold for the transitional period into young adulthood, the use of prescribed psychoactive drugs has been identified as a further step in the sequence. However, the potential existence of problem drinking as an intervening stage between marijuana and other illicit drugs, suggested by Jessor (Donovan and Jessor 1983), could not be investigated with the data available in this study. Sex differences in patterns of progression had not been previously reported nor investigated on a firm statistical basis. The new analyses point to a sex difference in the more important role of tobacco cigarettes among women than among men in the progression of drug involvement, and the more important role of alcohol for men. Cigarettes can precede marijuana in the absence of alcohol among women, whereas alcohol, even in the absence of cigarettes, consistently precedes marijuana among men. Cigarettes precede other illicit drugs among women, but not wrong men. Finally, among women but not men, prescribed psychoactive drugs can be initiated in the absence of prior experimentation with marijuana if cigarettes have been used, with alcohol consistently a prior stage for both sexes. On the other hand, alcohol is more important than cigarettes among men as an experience prior to marijuana use.

The present evidence for the existence of patterns of progression is stronger than could be derived earlier from analyses of Guttman scaling of cross-sectional or of short-term longitudinal data. Indeed, the exact timing of drug initiation, although elicited retrospectively, was ascertained in a cohort that was followed through the period of highest risk for initiation to legal and illegal drugs (but not for prescribed psychoactive drugs). In addition, the relative fit of alternative models could be subjected to statistical tests, an option not available for Guttman scaling tests.

It is important to keep in mind that although a clear developmental sequence in drug involvement has been identified. use of a drug at a particular stage does not invariably lead to the use of other drugs

higher in the sequence, Many youths stop at a particular stage and do not progress further.

PREDICTORS OF DRUG PROGRESSION

Furthermore, the existence of sequential stages of progression, does not necessarily imply causal linkages among different drugs. The observed sequences could simply reflect the association of each class of drugs with different ages of initiation and/or individual attributes rather than the specific effects of the use of one class of drug on the use of another. It is necessary to assess the extent to which the use of a drug at a particular stage actually determines or influences initiation of the use of a drug at a next higher stage.

The question of whether the use of certain drugs lower in the sequence influences the initiation of higher drugs was addressed through event history analysis.

Event History Analyses

Event history analyses (Tuma et al. 1978; Kalbfleisch and Prentice 1980; Coleman 1981) are better suited to answer this question than traditional methods of longitudinal data analysis. Since life history methods take into account the specific timing of occurrence of the events of interest, they guarantee the temporal order between the independent variables and the dependent event; like traditional methods, they also allow for antecedent predictive factors to be controlled. If the statistical effect of the use of an antecedent drug on initiation of a subsequent drug persists when other antecedent variables are controlled, this could potentially explain initiation of the later drug, and the earlier drug can be assumed to constitute a risk factor for progression.

The exponential hazards model with time-variant independent variables was used to estimate the determinants of hazard rates, which express the instantaneous rate of initiating a drug, given use of a prior drug and other factors (see Yamaguchi and Kandel 1984b). The initiations of marijuana, other illicit drugs, and medically prescribed psychoactive drugs after the original high school survey were the dependent events. Alcohol and cigarettes initiations were not predicted because they represent the earliest stage of involvement and we were interested specifically in identifying the role of prior drugs on the use of subsequent drugs. Use of any drug less than 10 times was considered as non-use.

The independent variables introduced as controls were found to be the most important correlates of drug use at one point in time and the most important predictors of initiation into different drugs over a short time interval. These variables included, in addition to drug behaviors and age, selected antecedent individual behaviors, attitudes, and interpersonal factors found in our own earlier work carried out while respondents were adolescents (Kandel 1980b; Kandel, Kessler and Margulies 1978; Kandel, Margulies and Davies 1978; Kandel et al. 1976) and in other studies (Brook et al. 1977;

Huba et al. 1980; Jessor 1979; Jessor and Jessor 1977; Johnston et al. 1978; Kandel 1978, 1980a; Kaplan 1980; O'Donnell et al. 1976),

Four distinct groups of independent variables were introduced: (1) use of drugs at a lower stage during the preceding month, or lifetime for those who did not use in the preceding month, (2) age at time of initiation of the class of drug under examination,(3) age of onset for selected other drugs, and (4) pre-existing characteristics measured in adolescence that may explain subsequent involvement in particular drugs, independently of prior experience with other substances. These variables included race, father's education, family intactness, participation in delinquency, perceived marijuana use by friends, attitude toward marijuana use, closeness to parents, perceived use of psychotropic drugs by mother, depressive symptomatology, dropping out of high school, and being a school absentee.[6] The first, second and third sets of variables are time-varying variables measured each month in predicting initiation during the subsequent month. The fourth set includes time-constant variables measured at the time of the initial survey, with the exception of a time-varying variable for dropping out of high school that occurred subsequently. Two categorizations of current and former use of lower stage drugs were introduced: (1) unique drug use variables and selected interaction terms between them, and (2) cumulative drug use stage variables that describe only the highest stage of drugs used currently or in the past.[7] Age of onset dummy variables were introduced to assess the interaction effects between the use (current or former) of a drug and its age of onset on initiation of another drug. The time-varying age of onset dummy variables take the value 1 only after initiation of the drug.

It should be noted that the fact that these individual characteristics were measured in adolescence somewhat limits the inferences that can be made. On the average, initiation to marijuana took place 30.6 months after the initial high school survey, to other illicit drugs 47.2 months later, and to prescribed drugs 60.7 months later. Unmeasured variables, such as attitudes and family characteristics at the specific time of drug initiation, rather than those measured in adolescence at the time of the initial survey, may account for the observed relationships between the uses of early and later stage drugs. However, the only time-variant factor other than drug use variables that could be introduced into the models is age, weakening the possibility of establishing the nature of the risk among drug transitions.

In order to avoid confounding antecedents and consequences of drug involvement, the analyses were restricted to persons who initiated each class of drugs after September, 1971, when the time-constant variables were measured, i.e. 76% of the total cohort for initiation of marijuana, 95% for other illicit drugs and 99% for prescribed psychoactive drugs. Thus, determinants of initiation identified in the analyses do not necessarily apply to the youths excluded from the analyses who initiated use prior to ages 15-16, especially for marijuana.

Sequential Patterns of Progression

For each drug initiation, three models were tested. Model 1 included dummy age variables and drug-use variables at prior stage(s); the latter could represent a higher stage of involvement than the current stage at the time of the transition. Model 2 added constant control variables measured in adolescence and a time-varying variable for dropping out of high school. Model 3 included age of onset of drug at a lower stage, but excluded the control variables in Model 2 due to the size limitation of the computer memory. For the same reason, the control variables in Model 2 were selected from a larger pool and included only those that had the greatest relative significance in event historical regressions carried out without prior drug-use variables.[8]

Initiation of Marijuana Use

Models of initiation of marijuana use are presented in table 5. Current use of alcohol and cigarettes have strong effects on the initiation of marijuana use among men and women (Model 1). The main effects (current use of one drug and non-use of the other) of alcohol and cigarettes and their joint effect are stronger among men than women, although the additional use of cigarettes when already using alcohol has a stronger effect among women than men. Former use of alcohol also has a significant effect among men.

Consonant with the earlier findings on periods of risk for initiation, strong age effects exist with individuals 20 years old and over, especially those aged 22 and over, much less likely to initiate marijuana than those under 20.

Controlling for selected antecedent behavioral, attitudinal, and environmental factors measured in adolescence, the effects of alcohol and cigarettes remain almost unchanged (Model 2). Perceived use of marijuana by friends has the strongest positive influence on initiation of marijuana. Among men, but not among women, involvement in delinquent activities and the belief that marijuana use is not harmful are also significant predictors.

Early onset of drugs lengthens the period during which individuals are at higher risk for initiating a drug at a higher stage. The inclusion of dummy age of onset variables for alcohol and cigarettes in the model, in addition to the current or former use of these drugs, tests whether the rate of initiation per unit time varies consistently according to age of onset, i.e., interaction between use (current or former) and age of onset. Model 3 introduces variables for age of onset to alcohol, after having excluded a similar set for cigarettes because of their insignificance. No such interaction effects between age of onset and use of alcohol appear among men, although they do so for women: the effect of alcohol on marijuana initiation disappears when alcohol is initiated after age 18.

Whether this sex difference in interactions leads to major differences in the overall effect of age of alcohol onset, including its main effect through lengthening the period of use, needs to be

TABLE 5

Predictors of Inltiation of Marijuana Use Among Men and Women

	MEN (N=449)			WOMEN (N=558)		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
I. Effects of Drugs (vs. never used before):						
(a) current alc.use	1.501***	1.463***	1.353**	0.933***	0.853**	-0.075
	(0.379)	(0.380)	(0.520)	(0.260)	(0.262)	(0.460)
(b) former alc.use	1.450**	1.502**	1.314*	0.049	0.055	-0.995
	(0.463)	(0.466)	(0.578)	(0.492)	(0.493)	(0.629)
(c) current cig.use	1.952***	1.907***	1.953***	1.331***	1.202***	1.331***
	(0.480)	(0.481)	(0.480)	(0.349)	(0.352)	(0.349)
(d) former cig.use	0.174	0.126	0.164	-0.280	-0.321	-0.338
	(0.238)	(0.260)	(0.238)	(0.307)	(0.310)	(0.308)
II. Age Effects (vs. under 16)						
16-17	-0.239	-0.233	-0.232	-0.041	-0.003	-0.020
	(0.233)	(0.233)	(0.235)	(0.275)	(0.276)	(0.287)
18-19	-0.281	-0.245	-0.256	0.018	0.157	0.139
	(0.238)	(0.239)	(0.244)	(0.277)	(0.278)	(0.277)
20-21	-1.471***	-1.412***	-1.439***	-0.942**	-0.759*	-0.775*
	(0.302)	(0.304)	(0.308)	(0.316)	(0.318)	(0.320)
22 and over	-2.606***	-2.554***	-2.571***	-1.971***	-1.772***	-1.777**
	(-0.387)	(0.388)	(0.392)	(0.376)	(0.379)	(0.380)
III. Age of Alcohol Onset (vs. 18 and over)						
Under 14	-	-	0.141	-	-	0.938*
			(0.370)			(0.408)
14-15	-	-	0.224	-	-	1.194**
			(0.383)			(0.411)
16-17	-	-	0.091	-	-	1.095**
			(0.384)			(0.410)
IV. Adolescent Characteristics						
Delinquency	-	0.403*	-	-	0.279	-
		(0.185)			(0.168)	
Friends' mari.use	-	0.420*	-	-	0.459*	-
		(0.195)			(0.180)	
Reg.mari.use harmful	-	-0.399**	-	-	-0.221	-
		(0.159)			(0.159)	
Closeness to parents	-	0.172	-	-	-0.122	-
		(0.243)			(0.200)	
Depressive symptoms	-	-0.097	-	-	-0.232	-
		(0.199)			(0.159)	
Mother's psychoactive drug use	-	-0.154	-	-	0.243	-
		(0.174)			(0.156)	
Being a former absentee	-	-0.030	-	-	0.003	-
		(0.160)			(0.187)	
Dropping out of high school	-	0.290	-	-	-0.713*	-
		(0.218)			(0.282)	
V. Constant	-5.677***	-5.880***	-5.687***	-5.809***	-5.833***	-5.868***
	(0.402)	(0.493)	(0.404)	(0.317)	(0.394)	(0.320)
VI. χ^2	151.72	173.90	152.35	138.23	172.38	149.95
df	10	18	13	10	18	13

*p<0.05; **p<0.01; ***p<0.001

Source: Yamaguchi and Kandel 1984b. Copyright 1984, American Public Health Association.

determined. The proportions of individuals expected to initiate marijuana use by certain ages were calculated for synthetic cohorts representing different ages of exclusive alcohol as well as joint alcohol and cigarettes initiations, under the assumption that no one had initiated marijuana use by age 15, and that use of the licit drugs was continuous (i.e. used at least once a month) after onset (see Yamaguchi and Kandel 1984b, for details). The age of onset of alcohol strongly influences the probabilities of initiating marijuana use, although more strongly for men than women, Assuming continuous use since onset, an additional 39% will have initiated marijuana use by age 25 among men who started drinking alcohol at age 15 as compared with those who started at age 21; among women, the excess proportions are 30%. The additional use of cigarettes also has strong effects on marijuana initiation, particularly when the legal drugs are initiated at age 18 and earlier (see table 6). We estimate that depending on age of onset, joint use of alcohol and cigarettes will generate a maximum difference of about 52 percentage points for men and 46 percentage points for women in the probability of initiating marijuana use during the age period 15 to 25 between those who start using legal drugs at age 15, and those who have never used them by age 25.[9] There is, however, a certain probability of initiating marijuana use without prior use of the two legal drugs, ranging from .07 to .20 depending upon the assumed age of marijuana initiation. However, this pattern of progression characterizes only 4% of the sample, since very few young people do not use any of the legal drugs.

Thus, the temporal order between alcohol or cigarettes and marijuana reflects not only the influence of the legal drugs on marijuana initiation but differences in the structure of age effects, with earlier initiation of alcohol than of cigarettes and marijuana use. The relative ambiguity in the temporal ordering of initiations between cigarettes and marijuana compared with alcohol and marijuana reflects these age effects rather than a weaker influence of cigarette use on marijuana initiation as compared to the influence of alcohol.

Initiation of Illicit Drugs Other Than Marijuana

Similar analyses were carried out regarding initiation of illicit drugs other than marijuana. Although the sequences between alcohol and cigarettes and between cigarettes and marijuana are somewhat indeterminate in predicting initiation of illicit drugs other than marijuana, an ordering among drugs was assumed that reflects the dominant sequential patttern, i.e., alcohol, cigarettes, and marijuana (table 7).

The propensity to initiate other illicit drugs increases strongly among men and women who are currently using marijuana or prescribed psychoactive drugs (Model 1). The lack of a statistically significant difference between the coefficients for the use of marijuana and prescribed psychoactives indicates that the additional use of the latter has no effect beyond that attributable to marijuana, an earlier stage in the sequence. Use of marijuana in the past, even when the individual is currently in a lower stage (cigarette, alcohol or no drug), increases the propensity of initiating other illi-

TABLE 6

Expected Proportions of Persons Who Will Initiate Marijuana as a Function of Age of Onset of Licit Orugs When (1) Only Alcohol Was Initiated and (2) Both Alcohol and Cigarettes Were Initiated: Synthetic Cohorts Who Have Never Used Marijuana by Age 15

	MEN (N=449)						WOMEN (N=558)					
	15	17	19	21	23	25	15	17	19	21	23	25
(1) Used Alcohol Only												
Age of Onset of Alcohol[b]												
Under 14	.00	.28	.46	.55	.57	.58	.00	.17	.32	.42	.45	.47
15	.00	.30	.48	.58	.60	.61	.00	.19	.35	.45	.48	.50
17	.00	.07	.29	.40	.44	.45	.00	.07	.23	.34	.38	.40
19	.00	.07	.13	.26	.29	.31	.00	.07	.13	.17	.19	.20
21	.00	.07	.13	.16	.20	.22	.00	.07	.13	.18	.19	.20
23	.00	.07	.13	.16	.17	.19	.00	.07	.13	.18	.19	.21
Never used	.00	.07	.13	.16	.17	.18	.00	.07	.13	.18	.19	.20
(2) Used Alcohol and Cigarettes												
Age of Onset of Alcohol &/or Cigarettes												
Under 14	.00	.34	.54	.64	.66	.67	.00	.25	.48	.56	.60	.62
15	.00	.36	.57	.67	.69	.70	.00	.27	.48	.60	.64	.66
17	.00	.07	.34	.47	.51	.52	.00	.07	.31	.46	.51	.53
19	.00	.07	.13	.29	.33	.35	.00	.07	.13	.20	.22	.23
21	.00	.07	.13	.16	.21	.24	.00	.07	.13	.18	.20	.21
23	.00	.07	.13	.16	.17	.20	.00	.07	.13	.18	.19	.21
Never used	.00	.07	.13	.16	.17	.18	.00	.07	.13	.18	.19	.20

[a]Assumed to start using at the beginning of the age and continuous use of alcohol and cigarettes after age of onset.

[b]probabilities in the lower triangular matrix refer to initiation of marijuana without prior use of a legal drug.

Source: Yamaguchi and Kandel 1984b. Copyright 1984, American Public Health Association.

TABLE 7

Predictors of Initiation of Other Illicit Drug Use Among Men and Women

	MEN (N=586)			WOMEN (N=673)		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
I. Effects of Drugs						
Current stage[a]						
Alcohol	-0.445	-0.530	-0.436	0.626	0.648	0.599
	(0.760)	(0.762)	(0.760)	(0.795)	(0.795)	(0.794)
Cigarettes	0.039	-0.105	-0.001	1.394	1.272	1.354
	(0.739)	(0.740)	(0.737)	(0.749)	(0.751)	(0.748)
Marijuana	3.326***	3.091***	2.228*	3.207***	3.053**	2.856***
	(0.682)	(0.687)	(0.887)	(0.700)	(0.707)	(0.824)
Prescribed psychoactives	3.586***	3.385***	2.756**	3.901***	3.772***	3.588***
	(0.773)	(0.782)	(0.986)	(0.754)	(0.765)	(0.803)
Former stage higher than present stage[b]						
Marijuana	2.546***	2.342***	1.409	1.122*	0.955*	0.707
	(0.539)	(0.592)	(0.784)	(0.468)	(0.476)	(0.647)
Prescribed psychoactive drugs	1.108	0.788	1.220*	0.221	0.197	0.188
	(0.572)	(0.580)	(0.576)	(0.549)	(0.565)	(0.552)
II. Age Effects (vs. under 16)						
16-17	0.002	0.044	0.126	-0.971*	-0.956*	-0.866*
	(0.491)	(0.401)	(0.404)	(0.406)	(0.408)	(0.415)
18-19	-0.544	-0.433	-0.241	-1.381***	-1.343**	-1.191**
	(0.408)	(0.410)	(0.416)	(0.407)	(0.412)	(0.427)
20-21	-0.853*	-0.711	-0.442	-1.271**	-1.217**	-1.029*
	(0.420)	(0.422)	(0.430)	(0.399)	(0.406)	(0.427)
22-23	-0.828*	-0.665	-0.372	-1.412***	-1.361**	-1.138*
	(0.424)	(0.429)	(0.437)	(0.413)	(0.420)	(0.444)
24 and over	-1.582**	-1.402*	-1.079	-1.606**	-1.607**	-1.310*
	(0.594)	(0.598)	(0.604)	(0.560)	(0.568)	(0.586)
III. Age of Marijuana Onset (vs. 20 and over)						
Under 14	-	-	1.588*	-	-	0.857
			(0.615)			(0.509)
14-15	-	-	1.346*	-	-	0.227
			(0.600)			(0.496)
16-17	-	-	0.811	-	-	0.351
			(0.606)			(0.492)
18-19	-	-	0.542	-	-	0.072
			(0.628)			(0.519)
IV. Adolescent Characteristics						
Delinquency	-	0.416	-	-	0.201	-
		(0.286)			(0.295)	
Friends' marijuse	-	0.545*	-	-	0.440	-
		(0.258)			(0.316)	
Regular marijuse harmful	-	-0.073	-	-	-0.177	-
		(0.220)			(0.268)	
Closeness to parents		-0.034	-	-	-0.287	-
		(0.264)			(0.322)	
Depressive symptoms	-	-0.054	-	-	-0.020	-
		(0.295)			(0.264)	
Mother's psychoactive use	-	0.392	-	-	0.033	-
		(0.207)			(0.259)	
Being a former absentee	-	-0.231	-	-	0.315	-
		(0.217)			(0.280)	
Dropping out of high school	-	0.162	-	-	0.370	-
		(0.247)			(0.306)	
V. Constant	-7.898***	-8.280***	-8.153***	-7.695***	-8.156***	-7.835***
	(0.748)	(0.835)	(0.760)	(0.727)	(0.832)	(0.737)
x^2	201.68	218.97	220.06	113.85	121.56	118.61
df	11	19	15	11	19	15

*p<0.05; **p<0.01; ***p<0.001

[a]Contrasted to no use of any drug.

[b]contrrsted to lower current stage, including no current use

Source: Yamaguchi and Kandel 1984b. Copyright 1984, American Public Health Association

cit drugs. There is a steady decline with age in the initiation of other illicit drugs that is similar to that found for marijuana.

Selected control variables do not reduce significantly the effect of marijuana use on the initiation of other illicit drugs (Model 2). Although adolescent delinquency and perceived friends' marijuana use (only among women) have strong effects on the initiation of other illicit drug use when drug use variables are not simultaneously included ($p<.001$ - data not presented), only the effect of friends' marijuana use remains marginally significant among men when the drug use variables are included in the model. The elimination or weakening of the effects of adolescent characteristics indicates the dominance of marijuana use in explaining the subsequent initiation of other illicit drugs. The data available prohibit determining whether characteristics measured at the time of initiation, rather than in adolescence, are important.

The effects of adolescent characteristics may be weakened by the time-lag between their measurement at ages 15-16 and the subsequent initiation to other illicit drugs. To investigate the predictive effects of these variables as a function of time-lag in measurement, an elaboration of the analysis was carried out for delinquency and marijuana use by friends by introducing interaction terms between these variables and age of initiation to other illicit drugs. Except for delinquency among men, the interactions are strong with the effects significant only under age 18 (data not presented). Two alternate interpretations are possible: (1) delinquency and marijuana use by friends influence the initiation of other illicit drugs only in adolescence rather than in young adulthood, or (2) the effects of delinquency and friends' marijuana use are relatively short lived and are observable only for a limited period (i.e. , 2 years) after their measurement. The second interpretation is indirectly supported with respect to friends' influence by the finding that marijuana use by current friends is related to the individual's use of other illicit drugs in young adulthood at the time of the followup survey ($r=.34$; Kandel 1984). The weakened effect of friends' use of marijuana at age 18 and over may be the result of changes in friends over time as well as a weakening in the effect of friends' influence itself.

Among men, there is a strong interaction between age of onset of marijuana use and current or former use of marijuana on the rate of initiation to other illicit drugs (Model 3). A similar trend is found among women although not significant. Men who initiate marijuana early, especially under age 16, tend to initiate other illicit drug use at a rate even higher than would be expected from the longer period of risk resulting from an early age of onset.

The expected proportions of persons who will initiate other illicit drug use as a function of age of onset of marijuana use was calculated for synthetic cohorts who were assumed to have never used other illicit drugs by age 15, and to have continuously used marijuana following onset. The age of onset of marijuana use strongly influences the proportions initiating the use of other illicit drugs, with the differences being especially striking for men who

TABLE 8

Expected Proportion of Persons Who Will Initiate Other Illicit Drugs as a Function of Age of Onset of Marijuna: Synthetic Cohorts Who Have Never Used Other Illicit Drugs at Age 15

	MEN						WOMEN					
Age of Onset of Marijuana Use[a]	15	17	19	21	23	25	15	17	19	21	23	25
Under 14	.00	.28	.47	.58	.66	.71	.00	.24	.34	.42	.49	.55
15	.00	.23	.39	.49	.57	.62	.00	.14	.20	.25	.30	.34
17	.00	.01	.14	.22	.29	.34	.00	.01	.09	.16	.22	.27
19	.00	.01	.01	.09	.15	.20	.00	.01	.01	.07	.12	.17
21	.00	.01	.01	.02	.06	.09	.00	.01	.01	.01	.02	.06
23	.00	.01	.01	.02	.02	.05	.00	.01	.01	.01	.02	.02
Never used	.00	.01	.01	.02	.02	.03	.00	.01	.01	.01	.02	.02

[a]Assumed to start using at the beginning of the age and continuous use of marijuana after age of onset. The effects of licit drugs before initiation of marijuana use are ignored. The absence of the use of prescribed psychoactive drugs is also assumed.

[b]Probabilities in the lower triangular matrix refer to the initiation of other illicit drugs without prior use of marijuana.

start marijuana use below age 17 (27% in the sample) and for women who start below age 14 (7%) (table 8). Marijuana use will generate a maximum difference of 68% for men and 53% for women in the probability of initiating other illicit drugs through the age period 15 to 25 between those who initiate marijuana use prior to age 14 and those who never start using marijuana. The probabilities of initiating other illicit drugs are very much reduced when marijuana use is initiated after age 19. Six percent of the total sample did so. Most importantly, persons with no experience with marijuana have very small probabilities of initiating other illicit drugs, ranging from .01 to .03 (men) or .02 (women) depending on the time span between age 15 and initiation of these drugs. Marijuana appears to be a necessary condition for the initiation of other illicit drugs in this cohort. This pattern contrasts with the probability of marijuana initiation in the absence of prior use of legal drugs, controlling for the age of onset of the legal drugs, as described

above. While the temporal order between alcohol and marijuana results in part from differences in age effects on the initiation of these two drugs, the temporal order between initiation of marijuana and other illicit drugs reflects the necessary use of marijuana prior to the use of other illicit drugs.

Current cigarette use in the absence of prior marijuana use also has a marginally significant effect (p=.07) on the initiation of other illicit drug use among women. To assess the magnitude of this effect, a synthetic cohort analysis was carried out for age of cigarette onset and initiation of other illicit drug use (unpublished data). In this cohort, women who initiate cigarettes at age 15 and use continuously thereafter, but do not use marijuana, will have a 7% probability of initiating other illicit drugs by age 25. This compares to a 2% probability for women who neither smoke cigarettes nor use marijuana.

Initiation of Prescribed Psychoactive Drugs

Analyses parallel to those for initiation to marijuana and to other illicit drugs were carried out for initiation to medically prescribed psychoactive drugs (table 9). The overall explanatory power of Model 1 is low, especially for women (X^2=18.90, df=10, p<.05). However the use (current or former) of other illicit drugs promotes the initiation of prescribed psychoactive drugs, an effect that is not eliminated by the introduction of control variables (Model 2). Furthermore, among men and women high depressive symptomatology in adolescence predicts an increased probability of initiating prescribed psychoactive drugs, as does maternal use of psychoactive drugs and dropping out of high school among women.

The main effects of these control variables and the current use of other illicit drugs remain statistically significant. Current marijuana use becomes significant when interactions between these control variables and the (current or former) use of marijuana and/or other illicit drugs are introduced in the model (data not presented). The only significant interaction is with dropping out of high school, and it is negative, implying that the main effect of that variable is underestimated. These results indicate that a large number of factors, illicit drugs as well as other characteristics, increase the risk for initiation into prescribed drugs among women as compared with men. The independent effects of the three control variables explain why the use of prescribed psychoactive drugs by women may occur in the absence of the use of illicit drugs and, in particular, why a sequential order between marijuana and prescribed psychoactives is not as well established among women as among men, as discussed earlier.

In contrast to the initiation of marijuana or other illicit drugs, the propensity of initiating prescribed psychoactive drugs tends to increase with age, as noted earlier. The expected proportions of individuals who will initiate the use of prescribed psychoactive

TABLE 9

Predictors of Initiation of Prescribed Psychoactive Drug Use

	MEN (N=610)		WOMEN (N=695)	
	Model 1	Model 2	Model 1	Model 2
I. Effects of Drugs				
Current stage[a]				
Alcohol	-0.306	-0.370	0.070	0.018
	(0.760)	(0.762)	(0.404)	(0.407)
Cigarettes	0.213	0.103	0.547	0.363
	(0.749)	(0.755)	(0.389)	(0.392)
Marijuana	0.243	0.140	0.593	0.570
	(0.694)	(0.703)	(0.388)	(0.390)
Other illicit drugs	1.246	1.244	1.306**	1.177*
	(0.706)	(0.727)	(0.472)	(0.472)
Former stage higher than present stage[b]				
Marijuana	-1.502	-1.542	0.180	0.164
	(1.282)	(1.288)	(0.372)	(0.381)
Other illicit drugs	1.309***	1.452**	0.658	0.485
	(0.437)	(0.456)	(0.395)	(0.408)
II. Age Effects (vs under 18)				
18-19	1.587*	1.534*	0.024	-0.009
	(0.649)	(0.650)	(0.319)	(0.321)
20-21	1.237	1.176	-0.205	-0.235
	(0.669)	(0.671)	(0.341)	(0.342)
22-23	1.272	1.196	0.055	0.039
	(0.668)	(0.670)	(0.324)	(0.326)
24 and over	1.745*	1.631*	0.573	0.578
	(0.695)	(0.698)	(0.363)	(0.368)
III. Adolescent Characteristics				
Delinquency	-	0.064	-	0.161
		(0.043)		(0.273)
Friends' mari.use	-	0.383	-	-0.210
		(0.470)		(0.352)
Regular mari.use harmful	-	0.806	-	0.161
		(0.421)		(0.270)
Closeness to parents	-	-0.220	-	0.168
		(0.421)		(0.321)
Depressive symptoms	-	0.902	-	0.652*
		(0.479)		(0.261)
Mother's psychoactive use	-	0.324	-	0.652**
		(0.364)		(0.247)
Being a former absentee	-	0.252	-	-0.128
		(0.316)		(0.379)
Dropping out of high school	-	0.562	-	0.738**
		(0.330)		(0.264)
IV. Constant	-8.759***	-9.469**	-7.185***	-7.879***
	(0.824)	(1.014)	(0.357)	(0.535)
χ^2	36.90	49.16	18.90	43.32
df	10	18	10	18

*p<0.05; **p<0.01; ***p<0.001

[a]Contrasted to no use of any drug.

[b]Contrasted to lower current stage, including no current use.

Source: Yamaguchi and Kandel 1984b. Copyright 1984, American Public Health Association.

drugs as a function of age of onset of marijuana use was calculated for a synthetic cohort. Since age of onset of marijuana use influences the initiation of prescribed psychoactive drugs, the age of onset of marijuana use is expected to influence the initiation of prescribed psychoactive drugs indirectly. The strength of these indirect influences can be assessed assuming that initiation of drugs as a function of age of onset of marijuana use was calculated for a synthetic cohort. Since age of onset of marijuana use influences the initiation of prescribed psychoactive drugs, the age of onset of marijuana use is expected to influence the initiation of prescribed psychoactive drugs indirectly. The strength of these indirect influences can be assessed assuming that initiation of other illicit drugs occurs according to Model 3 in table 7, and initiation of prescribed psychoactive drugs occurs according to Model 1 in table 9. Because of the combined use of the two models as well as the overall low explanatory power of Model 1 for initiation of prescribed drugs, the resulting expected probabilities may be somewhat unreliable.

The age of onset of marijuana, assuming both continuous use and the pattern of indirect influence described above, increases the proportions of persons who will initiate prescribed drugs by 8% to 12% during the age period 15 to 25, depending on sex (table 10). The influence is slightly stronger among women, since their average propensity to initiate prescribed psychoactive drugs is greater than among men. Persons with early age of onset of marijuana use have about twice as high a probability of initiating prescribed psychoactive drugs compared with persons who never used marijuana. Without prior use of marijuana, the probability of psychoactive drug initiation reaches about 6% by age 25 for men and 9% for women.

These findings indicate that the temporal order between the initiation of marijuana and that of prescribed psychoactive drugs among men, and to a lesser extent among women, reflects not only the indirect influence of marijuana use on the initiation of prescribed psychoactive drugs but also differences in the pattern of age effects in the initiation of the two classes of drugs. Marijuana use, although it has an indirect influence, is not always necessary for the initiation of prescribed psychoactive drugs. This is especially the case among women for whom factors such as depressive symptomatology and mother's use of psychoactive drugs in adolescence independently influence the subsequent initiation of these drugs in young adulthood.

The relatively low explanatory power of prior drug use and the importance of adolescent depressive symptomatology on the initiation of prescribed psychoactive drugs reflect the fact that the initiation of prescribed drugs is not solely under control of the individual user, but depends in part on actions taken by a physician.

CONCLUSIONS AND IMPLICATIONS FOR PREVENTION

In this concluding section, we sumnarize the major findings that have been presented and discuss their implications for prevention,

TABLE 10

Expected Proportions of Persons Who Will Initiate Prescribed Use of Psychoactive Drugs as a Function of Age of Onset of Marijuana Use: Synthetic Cohorts Who Have Never used Prescribed Psychoactive Drugs by Age 15

	MEN						WOMEN					
Age of onset of marijuana use[a]	15	17	19	21	23	25	15	17	19	21	23	25
Under 14	.00	.01	.03	.07	.10	.14	.00	.04	.08	.12	.16	.21
15	.00	.01	.03	.06	.09	.13	.00	.04	.07	.11	.14	.19
17	.00	.00	.02	.05	.07	.10	.00	.02	.05	.08	.12	.17
19	.00	.00	.02	.04	.06	.08	.00	.02	.04	.07	.09	.14
21	.00	.00	.02	.03	.05	.07	.00	.02	.04	.05	.08	.12
23	.00	.00	.02	.03	.04	.07	.00	.02	.04	.05	.07	.11
Never used	.00	.00	.02	.03	.04	.06	.00	.02	.04	.05	.07	.09

[a]Continuous use of marijuana after age of onset is assumed. Expected proportions take into account the indirect effect of marijuana use on the initiation of prescribed psychoactive drugs through the influence of marijuana use on the initiation of other illicit drugs and the influence of other illicit drugs on the initiation of prescribed psychoactive drugs. The use of other illicit drugs whose initiation occurs according to Model 3 of table 7 is also assumed to be continued after initiation.

[b]Probabilitjes in the lower triangular matrix refer to initiation of prescribed drugs without prior use of marijuana.

The drug histories from the cohort we have been following through their midtwenties indicate that for the legal drugs, cigarettes, and alcohol, and for most illicit drugs, except cocaine, the period of highest risk for initiation peaks at age 18 and declines sharply thereafter. Rates of initiation of prescribed psychoactive drugs increase sharply at age 18, in the very same period when initiation of illicit drugs subsides, and persists at an increasing rate through the midtwenties. Stabilization in patterns of use of licit and illicit drugs appears within 1 year after graduation from high school, with a decline in the most intense use of alcohol and illicit drugs occurring approximately at age 22, in contrast to the pattern observed for cigarettes. Why the decline in alcohol and illi-

cit drugs takes place in the early twenties is a matter for future inquiry. We would suggest that this decline reflects a process of psychosocial maturation and coincides with the assumption of the roles of adulthood in this period of the lifespan. These roles, such as getting married, entering the labor force, or becoming a parent, are conventional roles that may be incompatible with involvement in illicit drugs and in deviant lifestyles. Supporting evidence for this interpretation as it pertains to marital roles is provided by Bachman et al.(1984) and Yamaguchi and Kandel(in press).

There are also clear temporal developmental stages in the use of licit and illicit drugs from adolescence through young adulthood, when the period of risk for initiation into drugs, other than the prescribed psychoactive drugs, terminates. For men, the pattern of progression is one in which alcohol precedes marijuana; alcohol and marijuana precede other illicit drugs; and alcohol, cigarettes, and marijuana precede the use of prescribed psychoactive drugs. For women, the pattern of progression is one in which either alcohol or cigarettes precedes marijuana; alcohol, cigarettes, and marijuana precede other illicit drugs; and alcohol and either cigarettes or marijuana precede prescribed psychoactive drugs.

Although a clear sequential order of progression characterizes involvement in legal and illegal drugs from adolescence to early adulthood, the extent to which this order represents an explicit linkage in which a drug lower in the sequence increases the risk for progression to the next higher stage varies for different stages. The observed temporal order between the initiation of the licit drugs and that of marijuana reflects not only the influence of the first on the second but also differences in age effects on the initiation of different classes of drugs. The temporal order between initiation of alcohol and marijuana is stronger than between cigarettes and marijuana, despite the fact that the effect of alcohol use on the initiation of marijuana is slightly weaker than the effect of cigarette use. Age effects contribute more to the temporal order of initiations between alcohol and marijuana than to that between cigarettes and marijuana.

Age effects are almost completely absent on the observed sequential initiations of marijuana and other illicit drugs. Both current and former marijuana use strongly influence the initiation of other illicit drugs among men and women, controlling for age and selected preexisting individual differences. The probability that individuals who never use marijuana will initiate the use of other illicit drugs is very low. These findings strongly suggest that prior use of marijuana greatly increases the risk of initiating the use of other illicit drugs. These findings corroborate our prior conclusions and those conclusions reached by O'Donnell and Clayton (1982) on the basis of cross-sectional data.

The initiation of prescribed psychoactive drugs is the most difficult to predict, although it is affected by current or former use of other illicit drugs among men and women and by current marijuana use among women. The present data indicate that young people who use other illicit drugs (particularly marijuana among women and other

illicit drugs among men and women) between adolescence and young adulthood are more likely in early adulthood to use mood-changing psychoactive drugs prescribed by physicians. Marijuana also has an indirect effect in drug progression, since marijuana users are much more likely than non-users to initiate the use of other illicit drugs. Thus, early initiation into marijuana is associated with subsequent initiation to other illicit drugs and to medically prescribed psychoactive substances. The linkages with prescribed drugs are weaker and partly reflect age effects, however.

Jessor has recently suggested (Donovan and Jessor 1983) that problem drinking is an additional step that intervenes between the use of marijuana and of other illicit drugs. The existence of such a step could not be investigated with the data available for this cohort.

As noted earlier, the limitations of the inferences that link the usage of one drug to usage of another must be stressed. Transition into a particular usage pattern is determined not only by the use of drugs at a lower stage but by other factors, in particular personality and lifestyle variables. A limited set of variables was included and those included were measured in adolescence. Furthermore, the analyses were restricted to those who initiated each class of drug after the initial survey and excluded a certain proportion of early users. However, event history analyses enable valid inferences about the role of earlier stages on increasing the risk of progression to later stages by relying on the precise timing between events and the introduction of age and other control variables.

These findings have potentially important policy implications for the development of preventive and educational efforts. Early prevention efforts targeted toward reducing young people's initiation into the use of cigarettes and/or alcohol would reduce the use of marijuana, and prevention of early involvement in marijuana use would reduce involvement in other illicit drugs. Prevention of early marijuana involvement might also have modest effects on decreasing the use of prescribed psychoactive drugs mainly through reducing the use of other illicit drugs. However, it is important to remember that age effects determine in part the sequential patterns observed between the licit drugs and marijuana and between marijuana and the prescribed drugs, while such age effects are minimal for the observed linkage between marijuana and other illicit drugs. Thus, we speculate that while prevention efforts aimed at reducing involvement in legal drugs would lead to a decrease of initiation to marijuana, a certain proportion of young people would still initiate marijuana despite lack of prior experience with alcohol or cigarettes. Furthermore, since the temporal order between licit drugs and marijuana is in part due to age effects, prevention of early involvement in licit drugs may in part lead to an increase in the number of persons who will initiate marijuana without using licit drugs. By contrast, prevention efforts targeted toward reducing involvement in marijuana would be the most successful in lowering progression to higher stages of drug involvement.

The specific impact of these strategies can only be established through controlled prospective trials. However, the results suggest

further that for all drugs, prevention efforts will be more effective if they are targeted at reducing the risk of initiating the use of drugs rather than at decreasing use among users, since former and not only current drug use at a lower stage increase the risk of progression to a higher stage.

It is clear that prevention efforts must be initiated in adolescence. Indeed, the drug histories indicated that, for the legal drugs, cigarettes and alcohol, and for most illicit drugs, the period of highest risk for initiation peaks at age 18 and declines sharply thereafter, with the exception of cocaine.

While in this discussion we emphasize the period in the life span when intervention efforts should be initiated and the types of drugs to be targeted, it is also important to identify the nature of the populations at a particular stage who are most at risk for progression to the next stage or stages. This issue could only be dealt with in a limited way in the present study. The optimum research design for such an inquiry is one in which individuals are monitored closely over time and measurements taken of presumed important predictive factors, such as lifestyle variables, at a point relatively close in time to changes in drug behavior. Such an analysis was carried out in the earlier phase of our inquiry where we described the characteristics of adolescents at a particular stage of drug use who were at risk for progression to the next higher stage during a short interval of five to six months (see Kandel, Kessler,and Margulies 1978; Kandel 1980b). Peer influences were important in predicting the initiation to alcohol, marijuana, and other illicit drugs, but especially for marijuana. Depression, parental drug use, and lack of closeness between parents and their children were important in predicting the transition from marijuana to other illicit drugs. These earlier findings have recently been cited by the Rand Corporation (Polich et al, 1984) as a rationale for developing peer-based intervention programs. The present results, which document the continuing effects of perceived marijuana use among peers on initiation to other illicit drugs over a longer interval, provide additional support for this approach.

The notion that culturally and historically determined stages can be observed with respect to youth drug behavior receives strong additional supporting evidence from the analyses reported here. We propose that the notion of stages provides a useful framework around which to develop specific theories of initiation, progression, and regression in drug behavior and specific intervention strategies to deal with the various stages and phases of drug involvement.

FOOTNOTES

[1]As we confirmed subsequently with data derived from school records, these absentees can be considered to be truants, as per the definition proposed by Robins (Robins and Ratcliff 1980), i.e.,missing school on 10 or more days in two out of the eight semesters of high school. In the school year 1971-72, the average number of school absences reported for the former regular students who had

participated in the initial survey was 12 days as compared to 19.5 days for the former absentees.

[2]The sampling weights applied to the 1980 data took into account all relevant features of the sampling design, including the oversampling of homerooms with high marijuana use and the lower sampling rate of former absentees. Consistent with findings of other longitudinal studies, the non-participants in the followup were already somewhat different as high school students from the participants (Kandel et al. 1983). The non-interviewed students were more likely to be enrolled in New York City schools, to be male, to be black or Hispanic, to reside in mother-headed familes, to be less successful academically and to be more heavily involved in drugs, except alcohol, than the reinterviewed. However, the distributions of Time 1 characteristics are similar in the reinterviewed group and in the total target Time 1 sample. For most variables the amount of bias in the estimates is very low (about 1%). leading to the conclusion that the followup cohort constitutes a representative sample of the 1971 high school enrollment in grades 10 and 11 in New York State.

[3]Although validity of recall has been previously established for reports of certain drug use patterns (Ball 1967; Parry et al. 1970-71). underreporting, telescoping and distortions have generally been shown to affect recall of various life events (Uhlenhuth et al. 1977). However, as stressed by Featherman (1980), distortions in retrospective reports may not necessarily be greater than those in contemporaneous reports. In the earlier phase of the research carried out in high school, we found that inconsistencies in self-reported patterns of drug use over a 6 month interval were associated with light patterns of use (Single et al. 1975).

In order to assess the validity of retrospective reports in the followup interviews, we relied on two strategies. We compared: (1) reports in 1980 for similar events reported on in 1971, and (2) rates of retrospective self-reported drug use for 1977 with rates for the same age cohort interviewed contemporaneously in 1977 in the General Household Survey (Fishburne et al. 1980). The majority of recalled use patterns are consistent with those reported in 1971, especially for marijuana: 79% of males and 85% of females give consistent reports, although young people who reported not using as high school students are more consistent than those who reported using. The marginal distributions in reported lifetime prevalence are identical at both points in time (27%), but only because an equal number of persons aave inconsistent reports from the initial non-using (N=88) and using (N=86) groups. However, while in 1971, 259 adolescents reported to have already used marijuana, in 1980, only 173 (67%) of these same person; remembered having done so. The inconsistencies are larger for cigarettes and for alcohol than for marijuana. Thus, the distributions of self-reported users in 1971 were 71% for cigarettes and 86% for alcohol, whereas only 49% and 68%, respectively, recalled being users by 1980. Most of the inconsistencies represent failures to recall Time 1 use at Time 3. Similarly, there are discrepancies in the ages of onset of use recalled in young adulthood by those who had

indicated in 1971 that they were already using certain drugs, with a greater proportion reporting a later age of onset than was reported initially.

Although there appears to be a consistent telescoping and foreshortening of time in the recall process, there must be gradual adjustments over the life span being recalled, The annual prevalence of marijuana use (44%) reported retrospectively for 1977 at age 21-22, three years prior to the 1980 interview, is almost identical to that reported contemporaneously by members of parallel birth cohorts in the General Household Survey (Fishburne et al. 1980: table 18). In 1977, 41% of persons aged 18-21 and 36% of those 22-25 reported using marijuana in the last year. (Given the tabulations in the report on the General Household Survey, more exact age comparisons cannot be made.)

[4]Examination of patterns of initiation separately for beer, wine, and distilled spirits indicates that initiation of use of distilled spirits clearly lags behind beer and wine in the younger ages (data not presented).

[5]For alcohol, these observed proportions are 97% for men and 92% for women; for cigarettes, 65% and 63%, respectively; for marijuana, 64% and 61%; for other illicit drugs, 27% and 12%; and for prescribed psychoactive drugs, 10% and 14%.

[6]Strong limitations in the computer program restrict the number of control variables that can be included in a model. Because Time 1 data were not available for the subsample of former school absentees, a dummy variable for being a former absentee was included in Model 1, and the mean sex-specific value of each Time 1 variable among former non-absentees was assigned to former absentees. When the absentee dummy variable is included in the model, the coefficients for Time 1 variables are invariant regardless of the constant values for these variables assigned to absentees. The coefficient for the absentee dummy variable, however, depends on these assigned values and reflects two inseparable effects: (1) an overall effect of the absentees' deviations from the mean values of non-absentees on the Time 1 variables, and (2) a possible unique effect of being a former absentee.

Six variables measured at the time of the initial high school survey were dichotomized in order to reduce the number of covariate patterns.

Deliquency: lifetime participation in any of four major activities an recent participation in seven minor ones, including stealing or running away from home.
Friends' marijuana use: some, most or all versus few, none ever used marijuana
Attitude toward marijuana use: agrees use is harmful versus disagree or unsure
Closeness to parents: feel "somewhat" or "extremely" close to both parents versus all others

Depressive symptoms: six-item scale, with scores dichotomized at cut-off point at mean obtained by clinically depressed adolescents (16% of sample fell in this high category)
Mother psychoactive drug use: used tranquilizers, barbiturates or stimulants within the past 12 months versus did not use

[7]The drug stage variables were introduced in analyzing initiations of other illicit drugs and of prescribed psychoactive drugs to avoid under-identification. When two drug use'variables have significant effects, negative interactions between them are usually present. When a variable representing a higher stage drug such as marijuana is also in the model, these interactions reduce to insignificance the effects of the use of lower stage drugs in explaining the initiation of higher stage drugs. The stage variables incorporate these negative interaction effects. In addition, since persons who are using a higher stage drug are also likely to be using the lower stage drugs, events under stage 1 (or 0) of one dummy variable completely overlap the events under stage 1 (or 0) of the other variable. Introduction of interaction between a higher and a lower stage drug variable and a lower stage drug variable often generates under-identification between the higher stage drug variable and the interaction term. The stage variable removes these under-identification problems.

If use of a drug has a positive effect, its age of onset influences initiation by placing persons at higher risk of having the event for a longer period of time. In addition, the effect of use of a drug per unit time may increase or decrease depending on age of onset. Such interaction effects need to be taken into account in assessing the overall effect of age of onset. Only significant interaction terms are presented in the models.

[8]The following variables were also tested and excluded from Model 2 because they were found not to be significant: race, family intactness, father's education.

[9]Note that in this model, where marijuana initiation is assumed not to take place prior to age 15, the probabilities of initiation are slightly lower for those who initiated alcohol and/or cigarettes prior to age 14 than those who initiated at age 15. This result is a function of two conditions: (a) the model excludes the members of the cohort who started using marijuana prior to the time of the initial survey, and (b) adolescents who initiated the use of alcohol and/or cigarettes prior to age 14 made a transition into the use of marijuana at a faster rate than those who initiated alcohol and/or cigarettes at a later age. Early users of alcohol and cigarettes who were included in the analysis, if they did not initiate the use of marijuana prior to the high school survey, tended subsequently to initiate marijuana at lower rates than those who initiated alcohol and cigarettes at ages 15 or older.

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The Prevention of Adolescent Drug Abuse: Implications of Etiological, Developmental, Behavioral, and Environmental Models

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The emphasis in adolescent drug use research has shifted from the study of drug abuse in clinical populations toward the study of the behavioral epidemiology of adolescent drug use: the study of drug use and its correlates in normal populations. This shift followed the rapid expansion of the drug using population in the 1960s and 1970s and has provided important new information on the etiology of adolescent drug use.

This change has also increased awareness for individual drug use levels. Experimentation with many drugs is statistically normative among adolescents in this country: graduating seniors in 1982 reported a 58.7% lifetime prevalence rate for marijuana use, a 92.8% lifetime prevalence rate for alcohol use, and a 70.1% lifetime prevalence rate for tobacco use (Johnston et al. 1982). Yet most adolescents who experiment with drugs do not become chronic drug abusers. As a result, etiological researchers have begun to search for predictors of abuse as well as use.

A similar evolution has occurred in drug use prevention methods. With only limited data to guide the initial efforts, early drug education programs were generally atheoretical (cf. Schapps et al. 1981). Subsequent investigations have incorporated findings from etiological research and from research on behavior change strategies and adolescent development (e.g., Murray et al. 1984; Flay et al. 1983). The more recent programs have recognized that success cannot be measured simply in terms of abstinence. To interpret any use of drugs to mean that an intervention had somehow failed denies the pervasiveness of drugs in adolescent culture and the pervasiveness of moderate use of tobacco, alcohol and marijuana in our society.

This chapter reviews the contributions of etiological research to the developent of more effective prevention programs. The first section describes the correlates and antecedents of drug use and outlines existing etiological models which organize these variables and provide useful suggestions for prevention

researchers. The second section reviews relevant theories on adolescent development, behavior change, and environmental change and their implications for prevention methods. In the third section we present a new intervention program, with special attention to its application of findings from research in these areas. Finally, we suggest additional research to improve our ability to prevent drug abuse and minimize drug use.

CORRELATES AND ANTECEDENTS OF ADOLESCENT DRUG USE

Numerous cross-sectional and longitudinal studies have identified correlates and antecedents of adolescent drug use. These are generally grouped into four categories which describe demographic, social-environmental, intrapersonal, and behavioral factors. For general reviews, see Huba and Bentler 1980; Flay et al. 1983; Jessor and Jessor 1977; Jessor 1979; Johnston et al. 1982; Kandel 1978a, 1983, 1982; Lettieri and Ludford 1981; Miller et al. 1983; Smith and Fogg 1978; Wingard et al. 1979, 1980.

Demographic Factors

Both the probability and the extent of drug use increase as a function of age during adolescence and young adulthood except for tobacco and stimulants, adolescent males are more likely to use legal and illegal substances than females. This gender difference is most pronounced for heavy use of legal and illegal drugs. Students planning to complete 4 years of college have lower rates of illegal drug use, particularly for heavy use than those not expecting to do so. Both geographic region and population density are correlated with the prevalence of adolescent drug use, though ethnicity and socioeconomic status are only weakly correlated with prevelence. Early age of drug use onset appears to be the best predictor of abuse. In spite of these reliable cross-sectional associations, demographic factors other than age and gender account for little additional variance in predicting future adolescent drug use after social-environment, intrapersonal and behavioral factors are considered.

Social Environmentel Factors

Factors in the social environment that are associated with increased drug use include family or peer approval or tolerance of drug use, family or peers as real or perceived models for drug use, pressure from family or peers to use drugs, greater influence by peers than parents, incompatibility between parents and peers, greater involvement in peer-related activities such as dating or parties, greater reliance on peers than parents, absence of closeness to parents, unconventionality of parents, low educational aspiration for the children by parents, lack of parental involvement in the child's activities, week parental controls and discipline generally, end ready access to drugs. There is evidence that these sssociations are fairly constant across gender end ethnic groups, with only a few exceptions

(Jessor 1979). For example, females may be more susceptible to peer influences then males (Jessor et al. 1973; Kandel et al. 1978). There is also evidence that many of these correlates predict future drug use and that their predictive value varies with usage of different drugs (e.g., Huba and Bentler 1982; Kandel et al. 1978). The identified social-environmental antecedents suggest that future drug users exist in an environment characterized by multiple models for drug use, by significant others who tolerate or encourage drug use, and by ready availability of drugs; adolescents who spend most of their free time with peers are more likely to experience such an environment than those who spend their free time with their family or alone.

Intrapersonal Factors

Intrapersonal factors that are associated with drug use include greater value on independence, lower value on achievement, lower expectations for academic achievement, greater tolerance of deviant behavior, lower religiosity, greater criticism of social institutions, greater alienation from social institutions, greater rebelliousness, lower value on social conformity, greater receptivity to new ideas and experiences, greater interest in creativity and spontaneity, greater expectations of failure, lower sense of psychological well-being expressed through greater apathy or high levels of distress, and lower conformity to social conventions. Other personality factors have been suggested, but are less reliably associated with drug use; these include external locus of control, lower self-esteem (e.g., Kaplan 1982), and depressive mood (e.g., Kandel 1978b). Traditional classifications of psychopathology account for very little variability in drug use in nonclinical populations. A number of these correlates also predict future drug use: the intrapersonal antecedent factors generally suggest that relative to those who will not use drugs, future drug using adolescents are somewhat more unconventional end nonconforming, more open to new experiences end more spontaneous, and place lower value on and expect less from traditional avenues for achievement.

Behavioral Factors

Behavioral factors regularly associated with adolescent use of a particular drug include use of other legal or illegal drugs, various forms of delinquency, sexual activity, political activism, and declining academic performance. Longitudinal studies suggest that many of these behaviors precede heavy drug use rather then result from it (Kandel 1980).

Summary

The literature on the antecedents of adolescent drug use suggests that social-environmental, intrapersonal, and behavioral factors are the most important determinants of future drug use. The social environment may provide the necessary background

conditions for drug use through models and social supports, and through access to drugs or alternatives. However, not all adolescents in high risk environments choose to experiment or use drugs regularly. Intrapersonal and behavioral factors may be critical in determining the response to the environment through the relative value placed on conventional goals and activities and through the skills available to the adolescent to choose nondrug alternatives that meet his or her needs. The findings from the longitudinal studies imply that prevention efforts should focus on the social-environmental, intrapersonal, and behavioral factors, and suggest a broad-based approach rather then concentration on a single factor or subset of factors. They else imply that adolescent drug use is functional; thus, prevention efforts should focus on the functions served by drugs as well as on the more immediate predictors of drug use.

ETIOLOGICAL MODELS OF ADOLESCENT DRUG USE AND IMPLICATIONS FOR PREVENTION

Efforts to synthesize the substantial literature on correlates and antecedents of adolescent drug use into a meaningful etiological picture vary in the extent to which they accommodate the many factors identified. They also vary in the extent to which they treat drug use in isolation or in some broader context, and in the extent to which they provide useful prescriptions for prevention.

Stages of Development

Several researchers have suggested that adolescents who use many different drugs do so in an ordered fashion, systematically moving through a series of stages of drug use. Hamburg et al. (1975) observed that students generally experimented first with coffee and tea. This was followed sequentially by wine and beer; tobacco; hard liquor; marijuana; hallucinogens, stimulants and depressants; and narcotics. The onset points for these drugs were distinctly separate in time. Very few students involved with one drug had not moved sequentially through each of the preceding drug groups. Kandel (1975) reported very similar results on a much larger sample. She observed four stages: beer or wine, hard liquor and/or cigarettes, marijuana, and other illicit drugs.

Kandel et al. (1978) have observed that many of the correlates described earlier are differentially useful in predicting transition to each of these four stages. Alcohol use was best predicted by involvement in minor delinquent activities, greater involvement with peer activities, and greater exposure to peer and parent models for drinking. Parental models appeared particularly important for onset of alcohol use. Onset of marijuana use was best predicted by exposure to peers who use marijuana, participation in minor delinquent activities, and adoption of values and attitudes favorable to marijuana use and unfavorable to traditional institutions. Onset for use of other

illicit drugs was best predicted by poor relationships with parents; by exposure to peer and parent models for drug use, both legal and illegal; by psychological distress; by heavy use of marijuana; and by more unconventional and nonconforming attitudes and values.

Both Kandel (1975) and Hamburg et al. (1975) have been careful to point out that involvement at one stage does not necessarily lead to the next stage; however, involvement at one stage was very unlikely without involvement at the previous stage. The staging model suggests that intervention programs should be tailored to the developmental period of the target audience. It does not suggest that simply blocking the sequence can prevent further drug use. However, if a program can modify the social environment to reduce the risk of using a drug early in the sequence and provide adolescents with the intrapersonal attributes and behavioral skills they need to choose nondrug alternatives, then use of other drugs that occur later in the sequence also should be reduced. Finally, their findings suggest that though early intervention is desirable, continued attention also should be given to the evolving (and perhaps risk inducing) world of the adolescent.

Socialization and Selection

Kandel (1980, 1982) views drug use as one of many behaviors that results from interactions involving parents, peers and adolescents. She describes drug use as one of the possible outcomes of adolescent socialization, a process which balances peer and parental influences. Two processes are central to adolescent socialization: imitation, whereby adolescents learn behaviors through observing others, in this case peers and parents; and social reinforcement, whereby adolescents display behavior more often when it is approved by significant others, including parents. Kandel (1978b) has found evidence that selection also plays an important role. Socialization occurs as adolescents learn new behaviors by interacting with others. Selection occurs as they seek new friends with values and behaviors similar to their own. Finally, Kandel (1980) argues that parent and peer influences are often issue specific. For example, parental influence is stronger in relation to future roles, while peer influence is stronger in relation to the daily issues confronting the adolescent.

The socialization framework suggests that interventions should modify the behavior of existing models if they use drugs and provide as many non-using models as possible, both peers and parents. It suggests that adolescents be rewarded for choosing alternatives to drug use and that these rewards should come from both peers and parents. Finally, interventions should try to guide the peer group selection process to avoid selection of youths at risk for drug use.

Self-Esteem

Kaplan (1932) includes drug use as one of many forms of deviant behavior. Persons who fail in their interactions with their peer group are said to become self-critical and lose self-esteem. Where this failure is repeated and the loss of self-esteem is strong, the individual may reject the peer group, associated institutions, and standards because they are associated with the negative self-feelings. Since behaviors associated with traditional society have failed, deviant behaviors are tried in an effort to improve self-esteem. For example, the individual may seek out a new peer group in which acceptance is more likely, and in which the new deviant behaviors are supported. Deviant behavior is seen as a mechanism to improve self-esteem which was lost through poor early experiences with a traditional peer group.

Kaplan's conceptualization concentrates on only one aspect of the literature on correlates and antecedents for adolescent drug use. He places drug use among the many forms of deviant behavior, and provides little in the way of specific information about why drug use might develop rather then other forms of deviant behavior. The prevention researcher might infer that drug use may not develop if nondeviant behaviors can be made to result in peer group approval, but there is little guidance beyond this general suggestion. This formulation may be attractive to many because it provides a single target, self-esteem, but labeling the cause is not helpful. without more specific guidance concerning processes and mechanisms.

Stages of Antisocial Behavior

Where Kandel (1975) and Hamburg et al. (1975) have outlined stages of development specific to drug using behaviors, others have suggested stages of development for deviant or antisocial behavior more generally. Loeber and Schmaling (in press) join Kaplan in viewing drug use as but one form of deviant behavior. Deviant behavior is classified as either overt (confrontive) or covert (concealed). Both forms develop naturally in children (e.g., making up stories, grabbing, wandering away from parents, hitting, etc.) and generally disappear through the normal socialization and maturation processes. For some, these early forms may mature into lying, stealing, vandalism, trespassing, truancy, drug use and other more serious forms of deviant behavior as the child moves into and out of adolescence. Loeber and Schmaling even present a timeline for the emergence of the new forms of deviant behavior as they occur in the absence of appropriate socialization. Robins (1978) presents evidence in support of this developmental sequence, showing that most antisocial adults were also antisocial children, and that the best predictor of adult antisocial behavior is the range of antisocial behaviors observed in the child. Drug use is thus viewed as a natural result of the development of deviant behavior if socialization to conventional mores is unsuccessful.

This formulation suggests that drug use may be prevented by properly socializing the child. It would seem to place the onus for the elimination or modification of these behaviors on parents and on child-rearing practices. It also may be simplistic in suggesting that controls alone, applied during childhood, can combat the subsequent influence of peers in adolescence. This formulation does not specifically address the issues of social environment, intrapersonal attributes, or behavioral skills, but should not be seen as orthogonal to the positions of those etiologicel researchers who do. This approach is helpful in identifying deviant behaviors which are forerunners to drug abuse; additional research could focus on the socialization processes that eliminate these behaviors in some children and not in others. Other research could examine the interaction of the social environment beyond the parent on the development of these behaviors. Obviously, longitudinal designs are needed to test these emerging hypotheses.

Distribution of Consumption Model

The distribution of consumption model holds that the distribution of drug use in the society is lognormal: the higher the average consumption, the greater the proportion of heavy users (Gullotta and Adams 1982). The model predicts that reducing the average consumption will also reduce the proportion of heavy users. This approach intentionally ignores the literature on correlates of adolescent drug use. Rather, it looks at drug use on a societal level, indifferent to the particular reasons that any individual might use drugs. This model also may be appealing for its simplicity.

The implications for prevention are clear: regardless of the means, reducing the average intake will also reduce the proportion of heavy users. The means for reducing the average intake may be accomplished through efforts to reduce demand es well as supply. Demand reduction may be accomplished through changes in social norms that encourage lower consumption, through alterations in the variety of pressures that would otherwise encourage consumption at the individual level, or through changes in the pricing structure. Supply reduction may be accomplished through limiting production or through economic or legislative action.

Problem Behavior Theory

Jessor and Jessor (1977) have presented a model which places drug use in the context of other problem behaviors such as precocious sexual activity, delinquency and social activism. Problem behaviors are those which are inappropriate for the age group or which are not sanctioned by society. The Jessors suggest that both environmental and individual difference factors contribute to the development of problem behavior, and their conceptualization of three major systems of predictor variables (personality, perceived social environment, and behavior factors)

has provided a framework useful to many etiological researchers.

The personality system includes three major structures. The motivational-instigation structure is concerned with the individual's sources of motivation and includes the goals of academic achievement, independence, and peer affection, as well es the expectation for achieving each of these goals. The relative value of achievement versus independence is also considered. The personal belief structure is concerned with the cognitive controls that inhibit problem behavior and includes the variables of social criticism, alienation, self-esteem, and internal/external locus of control. The personal control structure is similar to the personal belief structure in providing controls on problem behavior, but does so in a more direct manner through the variables of deviance, tolerance, religiosity, and the discrepancy between positive and negative functions of problem behaviors.

The perceived environment is separated into proximal and distal structures composed of variables that are related to problem behaviors such as drug use. Six variables are within the distal structure: perceived support from parents and from peers, perceived controls from parents and from friends, compatibility between parents and peers in their expectations for behavior, and the relative influence of peers versus parents. The proximal structure includes parent and peer approval for problem behavior and peer models for problem behavior.

The behavioral system is divided into two structures. The problem behavior structure includes six behaviors: political activism, marijuana use, sexual activity, drinking, problem drinking and general deviant behavior. The conventional behavior structure includes two variables: involvement with a church or formalized religious activity and academic achievement.

The Jessors' conceptualization also identifies demographic and socialization factors, but assigns them a very minor role relative to the personality, perceived environment, and behavioral systems. In fact, Jessor (1979) has observed that the relationships between the many postulated factors and problem behaviors hold rather well across ethnic groups and geographic regions.

The problem behavior approach offers a great deal of useful information to the prevention researcher. The Jessors have taken great care in specifying variables and positing relationships between them. They have helped focus attention on the social environment rather then solely on dysfunctional personality states. They also have directed attention to the functionality of drug use for adolescents. In particular, they have helped establish the concept of a behavioral syndrome that can be predicted and that is maintained over time; this has been useful in directing the focus of prevention research on multiple behaviors. In emphasizing the role of drug use in normal

adolescent development, they have stressed the need for prevention goals other than abstinence. The prevention researcher is led to a developmental approach, based on the functions served by drugs at a specific stage, which particularly addresses the social environment (e.g., models, social supports, access), places drug use in the context of other problem behaviors, and focuses on minimizing drug use, preventing abuse, and delaying onset.

Domain Theory

Huba, Bentler, and colleagues present a domain theory for the development of drug use among adolescents (Huba et al. 1980a; Huba and Bentler 1980; Huba et al. 1980b, 1981a, 1981b; Huba and Bentler 1982; Newcomb et al. 1983). Their framework is largely concerned with behavior patterns and styles rather than component behaviors, and identifies several biological, intrapersonal, interpersonal, and socioculturel characteristics which influence one another and the behavior displayed by the individual.[1]

In this formulation, the most important determinants of drug use are represented by the individual's psychological status, intimate support system, and behavioral pressures system (e.g., Huba and Bentler 1982). Psychological status refers to the enduring psychological characteristics of the individual. The intimate support system refers to the person's family and friends. The behavioral pressures system consists of the perceptions of the social desirability of selected behaviors. Having friends who don't believe in the standard work ethic or school ethic is related to greater general drug use. Students who spend a large proportion of their free time with peers are more likely to use drugs. Adolescents who are exposed to drug using friends and adults report a wide range of drug use. Adolescents who know peers who can supply a variety of drugs are likely to use such drugs.

These investigators have suggested that the

> ...initiation of drug use, particularly when it occurs in adolescence, is almost entirely derived from self-perceived behavioral pressure resulting from the intimate support system. The intimate support system plays a role in moving the individual to drug use through peer values, models, and reinforcers, and through inadequate support of alternative, healthy behaviors and goals that would inhibit susceptibility to drug use. (Huba et al. 1980a, p. 31)

They also argue that the relationships among their variables and domains probably change as the child matures through adolescence, though they have not specified those changes.

This model suggests that drug use results from the interplay of a number of variables and that prevention efforts should concentrate on behavioral pressure, intimate support, and personality factors. Programs should address all three areas rather then concentrating on any single factor. Particular strategies that are suggested include changing peer values, providing alternative role models, providing reinforcement for nonuse, and promoting health-enhancing behaviors which fulfill the same functions otherwise served by drugs. Their model also suggests that simply imparting knowledge about drugs and drug use to adolescents would have a very minor impact, if any, on actual drug use.

Learning Theory

Akers et al. (1979) apply basic principles of social learning theory, differential association theory, and operant conditioning theory to the development of adolescent drug use. In this framework, deviant behavior is likely to occur when it is differentially reinforced and is defined as desirable by influential others. More regular use is predicted by the extent to which the pattern of use is sustained by reinforcement from the substance itself, by exposure to models using illegal substances, and by the degree to which substance use is not deterred es a result of negative consequences or sanctions from peer groups, parents, or the community. Future drug-using children are exposed to en environment which supports drug use and provides models for use. Imitation of drug users is important in encouraging the initial experience and in defining the normative behavior related to drug use. After the initial trial, the actual effects (both social and nonsocial) of the particular substance influence the probability that the substance would be used again.

Akers' formulation identifies a number of the mechanisms which may be important in the development of drug use. Thus, the common observation that drug use occurs more frequently among adolescents whose peers use drugs may be seen in Akers' framework as an instance of an influential person who defines normative behavior for the peer group and provides a model for imitation.

Akers' conceptualization also provides a number of useful guidelines for the prevention researcher. The major targets under this framework would be the models for drug use in the environment. Adolescents would be exposed to nondrug-using models and peers, and parents would be encouraged to express disapproval of drug use. In addition, it would be important to establish nondrug use as normative for the peer group.

Developmental Model

Flay et al. (in press) present a developmental model that is specific to cigarette smoking onset but which may have

application for general drug use onset as well. They identify five stages of smoking: preparation, initiation, experimentation, regular smoking, and habitual smoking. They suggest that family influences are most important during the preparation stage, helping to shape attitudes about smoking, define what smoking is like and what its functions are, and establish intentions to try smoking. Peer pressure is suggested as the most important factor in determining when cigarettes are first tried. Flay et al. (in press) suggest a number of reasons why teenagers may start to smoke. Smoking may be en effort to achieve social acceptance; it may be one of many experimental activities shared with the peer group; it may be a means to control emotions or to overcome low self-image; or it may be a means to define oneself as tough or independent. Attitudes developed during the preparation stage may effect the selection of peers who would be chosen on the basis of like attitudes, in a way similar to what Kandel (1978b) cells selection. According to Flay et al. (in press), selection of peers may be influenced by socioeconomic status since that domain influences the child's environment. During the experimentation phase, peer pressure may continue as an important factor, but social motives for smoking and the physiological effects of the first cigarettes will take on increasing importance. If the first experience is very negative, the adolescent may be less likely to continue. If the first experience is very positive, either through a positive physiological reaction or reinforcement from the peer group, then smoking may continue. Family influence would contribute during the experimentation phase through the availability of cigarettes in the home. Fley et al. suggest that the social reinforcements obtained from smoking are probably "the most important influence on whether or not an experimenting adolescent will become a regular smoker" (p. 19). According to this view, changes in smoking patterns as the adolescent moves into adulthood are probably largely determined by the physiological effects of the cigarettes.

This developmental model clearly defines the role of time in smoking or drug use onset and couches the whole process in a developmental context. This formulation also identifies a number of points for possible intervention, emphasizing the role of timing in providing age appropriate skills. This formulation also focuses clearly on the various functions served by cigarette smoking for the adolescent and on the role that those functions may play in the development of smoking.

Summary

Nine models for the etiology of drug abuse have been examined. Problem behavior theory, domain theory, and Flay's developmental model suggest that drug use is a functional behavior for adolescents, and that prevention efforts should address this functionality and provide alternative behaviors for drug use rather than simply trying to suppress the

underlying need or reason for use. These positions, together with the stages of drug use and stages of antisocial behavior models, place drug use in a developmental context, suggesting that the factors that influence drug use evolve as the child matures through adolescence, and that the developmental period of the adolescent should be considered in any prevention effort. They also suggest that drug use is common for many adolescents in today's culture. There is general support among the models to consider drug use as a part of a larger constellation of behaviors, whether labeled problem behaviors, antisocial behaviors, or by another name. This suggests that prevention programs must treat drug use in its behavioral context as well es its developmental and functional context. Finally, there is strong support for social-environmental factors such as modelling, availability of drugs, and social supports in the development of drug use. Though the various models often use different terminology, there are remarkable similarities in their implications for prevention efforts.

ADOLESCENT DEVELOPMENT, BEHAVIORAL CHANGE, AND ENVIRONMENTAL CHANGE MODELS AND IMPLICATIONS FOR PREVENTION

In addition to etiological models, three other perspectives merit consideration in planning drug abuse prevention programs. The first is concerned with adolescent development and focuses on the normal changes that occur during this period. This perspective places drug use within a framework of the challenges and capabilities of the teenage years. Consideration of these issues will improve the content of the interventions and the context in which they occur. Two additional perspectives are concerned with the techniques for changing behavior. Behavioral and environmental change theories address the question of how end focus on progressive refinements in methods to answer that question.

Adolescent Development Models

Adolescence is a time of change. The extensive literature on this life stage underlines both the complexity and importance of this period. For example, Havighurst (1972) describes the developmental tasks associated with adolescence from a socially defined viewpoint. These tasks include: establishing autonomy and sense of self, separating from the family, leaving school, and selecting a career. Piaget (1932) describes the shift or growth in cognition from literal thought to that which is more abstract and hypothetical. Likewise, moral reasoning changes from more absolute, personal appraisals to those which are more relative and universalistic. However, these transitions are only exemplary. Further, they are not synchronous relative to physical changes. As a result, even though adolescence is a time of change, how and when that change occurs differs markedly among individuals and among the types of change that occur within individuals.

Significant social-environmental changes also have been noted during adolescence. Many are a direct result of physiological developments (e.g., the ability to reproduce end the consequent self-preoccupation with body functioning), while other changes are determined environmentally. The increasing importance of peers relative to family is one of the most critical areas of social change. With this shift comes the possibility of new and influential role models and the potential for discord when values of peers end parents conflict. A major environmental change is entry into junior high and high school, which present adolescents not only with multiple teachers and peers, but also with a less controlled, less personal environment. As a result, students in secondary schools have more opportunities to talk about and engage in drug use behaviors. Schools have been shown to contribute independently to student behavior problems and smoking rates, as well as to influence program effectiveness (Flay et al, in press).

Drug use may be perceived es a means to ease the challenges which adolescence brings. Drug use may be seen as a way to consolidate with peers, as a way to establish autonomy, es a way to separate from the family, and as a way to address the emerging questions end hypotheses adolescents have abut themselves. The complexity of adolescence makes it a difficult period in which to intervene. At the same time, the critical role that adolescence plays in shaping adult behavior underscores the need to establish health-enhancing behaviors during adolescence to ensure that the emerging adult has every opportunity to function successfully and productively.

These issues are very important to the prevention researcher. Programs at various points in adolescence should be different, since, for example, significant changes in thought processes, morel considerations, and physiological status are occurring throughout the adolescent period. The relatively impersonal and less controlled environment of the secondary school might require more programmatic attention to the variety of messages about drug use that are promoted within the school, as well as methods to clarify those messages and disseminate them consistently. This also suggests that effective strategies to change school environments are needed.

Behavioral and Environmental Change Models

Social-psychological theories, particularly behavioral theories, have formed the basis for strategies for behavior change. In drug abuse prevention programs, conceptualizations have ranged from medical metaphor to multidimensional formulations (McGuire 1969; Perry and Jessor 1983). Among these, theories of mass communication, social learning theory, and more refined adolescent behavior change models have been applied most extensively.

Mass communication models separate the components of the influence process into six major levels: sender, receiver, message, medium, feedback, and noise (Robertson 1982). When messages are given and received under optimal, desired conditions, the expected effects are increasingly behavioral, from passive awareness on the part of the receiver, to knowledge and attitudinal change, and finally to trial behavior and adoption. Mass communication models have been particularly useful to program planning through their delineation of effective communication processes and their focus on mass rather than individual appeal.

By contrast, social learning theory (Bandura 1977) is a model that explains individual behavior and behavior change. Two systems of internal and external determinants are seen as interactive in their influence on behavior. Internal determinants include cognitive information processing variables, personal norms or performance standards, and motivation. External determinants involve physical and social cues and reinforcers. Three mechanisms for behavior adoption are proposed in this model: acquisition through observation and modelling, performance due to incentives and skills, and the reciprocal influence of internal and external determinants around a particular behavior.

Roth of these perspectives have implications for prevention. Mass communication models suggest that the sender should at least be credible to the receiver around the topic of drug use. Unlikely "senders" in these programs are teachers or adults generally, as they might be seen as too removed from the subject. Older adolescents or peer leaders appear to be more credible sources of prevention messages. Likewise, the communication models suggest that messages should be relevant to the receiver. Health consequences information would probably be less relevant than social concerns or more immediate consequences of drug use. Social learning theory complements these approaches and suggests the use of attractive role models, direct reinforcement for not using, and social skills training to resist peer pressure. Because these models have been formulated primarily for commercial application, the persuasion strategies suggested-such as offering direct benefits, solving recognized problems, selecting benefits or problems of concern to a particular audience, and linking targeted behaviors to these benefits or solutions to problems-generally have been applied in prevention programs within the context of other behavioral strategies.

AMAZING ALTERNATIVES

Our own work has drawn from several. of the etiological models discussed earlier, notably problem behavior theory, and from the literature on adolescent development, behavior change and environmental change strategies. In particular we have concentrated on social-environmental, intrapersonal and

behavioral attributes that are predictive of drug use, that can be defined in the context of adolescent developent, and that can be changed.

Several of the etiological models, particularly problem behavior theory, domain theory, and Flay's developmental model, suggest the functional relevance of drug use among adolescents. Drug use appears to serve a variety of different functions for adolescents at various ages and under multiple conditions. We conducted a series of interview studies to better identify the functions that appear most important to adolescents. We identified and labeled six that appear to be most prevalent: transition marking, social acceptance, stress reduction, personal energy, recreation, and relief from boredom or loneliness. Transition marking and social acceptance appear particularly important among younger adolescents while stress reduction appears more important among older adolescents. Personal energy, recreation and relief from boredom and loneliness appear common needs for many adolescents. These functions may be seen as needs or challenges facing adolescents. Through observing others and through direct experience, adolescents learn which behaviors are useful in meeting these functional needs, i.e., behaviors take on functional meaning. Behaviors that have similar functional meanings may be seen as alternatives from which the adolescent may select a particular response as needed. Factors influencing the selection process may include the behavior of available models, pressure from peers, access to a variety of activities, etc. For example, adolescents may choose drug use as a method to make new friends, or they may choose a healthier alternative.

We have described elsewhere our general approach to health promotion: to introduce or strengthen health-enhancing behaviors and to weaken or eliminate health-compromising behaviors. This approach fits very well into the functional meaning framework. Our prevention efforts seek to introduce and strengthen nondrug alternatives for the various functional needs of the target population while simultaneously discouraging drug use. Rather than focus primarily on teaching adolescents how to "say no" to drugs, we have also taken on the other challenge, teaching them to suggest and practice nondrug alternatives. By recognizing that functional needs change during adolescence we can generate age-appropriate interventions. By studying behavior change strategies, we can select techniques that work with the target population. By learning more about the environment of the adolescent, we can attempt modifications to further promote health-enhancing behaviors and to discourage drug use.

Our current seventh-grade drug abuse prevention program, Amazing Alternatives, is an outgrowth of testing several strategies in our smoking prevention work and then applying the functional meanings approach consistently throughout the

program. The program's goal is the prevention of regular tobacco, alcohol, and marijuana use among seventh-grade students. Four junior high schools participated in each of three conditions. Eight schools took part in the Amazing Alternatives classroom program. Of those, four schools have had additional activities that involve the school rules, parent and teacher cessation efforts, additional classroom activities, and parent newsletters. The four remaining schools serve as no-treatment controls.

Amazing Alternatives consists of nine 1-hour sessions. Each class is led by four elected and trained peer leaders who engage their classmates in:

1. Discussions on the immediate and long-term consequences of drug use, which display publicly the range and extent of negative consequences of use.
2. Examining why adolescents use drugs, that is, the functions that drug use serves; these include having fun, being accepted, becoming an adult, and responding to personal problems.
3. Learning how those functions are established by friends, media, and adults by examining their own expectations for drug use by peers and by analyzing cigarette and alcohol advertising methods.
4. Finding alternatives to drug use that serve those same functions, including a variety of health-enhancing alternative activities.
5. Learning to counter-argue advertising efforts and creating antidrug media; both antidrug posters and videotapes are made.
6. Practicing ways to identify and resist peer pressure and forming alternative groups involving actual rehearsal of refusal methods.
7. Learning how to be an assertive nondrug user in a culture that includes many drug users.
8. Making public commitments to continue nondrug use patterns, which is carried out as a classroom activity.

The theme of the program is a maze. The maze signifies the many paths to reach a goal or purpose or need. In this case the goals are identified by the students: to have fun, to be accepted, to become an adult, to solve personal problems. The aim of the program is to help adolescents understand the various paths available to reach these goals, to choose healthful ones, and to promote an environment supportive of those choices.

In the four schools with additional components beyond the basic classroom program, efforts are aimed at changing the adolescent's larger social environment. Newsletters to parents emphasize the importance of appropriate parent-child communication about drug use and include homework assignments such as structured interviews to help achieve better

communication. School rules are clarified as peer leaders on videotape tell their classmates the rules on drugs and the reasons for those rules. An alternatives week, planned by peer leaders, promotes and reinforces health-enhancing behaviors. Finally, smoking cessation among parents is facilitated for those who are interested.

This brief description of Amazing Alternatives should provide a more concrete example of how one prevention program has attempted to build from the etiological evidence, adolescent development literature, and behavior and environmental change strategies that have been presented.

CONCLUSIONS AND RECOMMENDATIONS

Etiological work has been crucial in shaping current prevention efforts. The models reviewed have contributed to the specification of the most proximal variables of concern as well as suggesting methods for achieving change in drug use patterns. The change in focus of prevention efforts from knowledge dissemination programs to social skills and environmental concerns has come directly from this literature. Recommendations for future work should be seen in light of this substantial progress over the past 15 years.

Still more work is needed to advance efforts in prevention research. First, there is a critical need to examine the relationship between drug use and the health-enhancing behaviors which might be suggested as functional alternatives. Little is now known about the relationships among these health-enhancing behaviors or their correlation with drug use. Health-enhancing behaviors that are inversely related to drug use would naturally deserve targets for promotion.

Second, additional work is needed to clarify the goals for prevention research. Several possible goals have been suggested, including delay of first use, minimization of use, prevention of abuse, and abstinence. The methods required to achieve these goals differ, and additional research to identify the early behaviors that predict abuse or other health-compromising outcomes would help to clarify which goals are most appropriate. It is unlikely, for example, that having ever used a drug will prove to be the critical factor predicting abuse; if it is not, abstinence may be an inappropriate goal, both based on the research evidence and upon the reaction such a goal elicits from adolescents. On the other hand, as age of first use appears to be critical, greater effort could be concentrated on intervention at an early age.

Third, programs should be tailored to meet the needs of different adolescent stages, especially around behaviors that are maintained into adulthood, such as cigarette smoking. Efforts to promote smoking cessation with adolescents, for example, have shown limited and little success, but this may be

due to the use of adult models of behavior change applied to this cohort, rather than more age-appropriate interventions.

Fourth, to aid in developing appropriate interventions, etiological work should continue to address the relative importance of the multiple correlates and antecedents of drug use, to better identify the causal linkages that predict use, and to clarify how these causal linkages change over time, are different for various subgroups, and are different depending on the drug in question.

Fifth, conceptual models for the environmental context of drug use – and ways to change that context – warrant exploration. The specification of environments at home, at school, or in the community could lend insight to methods or strategies to change those environments. This might include a better understanding of how norms, expectations, opportunities, barriers, models, and social support operate in those given contexts. Additionally, these explorations might serve to clarify how functional meanings for use are established in different environmental contexts, and how drug use develops differently as a result of them.

Finally, in considering the extent of drug use in our society, more attention might be given to the community of the 1980s. This includes the major social and economic networks that influence community allocations, the existing behaviors of people in the community, the community's drug use history, and the goals of the community-at-large. Comprehensive community drug abuse prevention efforts have begun and would benefit from research on the community and the process of community change.

FOOTNOTES

[1] Their research is the first systematic application of causal modeling techniques to the study of drug use among adolescents. Though this approach may help establish causal pathways among the numerous constructs and variables identified by so many investigators, it is not universally accepted (Rogosa 1982).

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Bridging Etiology and Prevention in Drug Abuse Research

Richard Jessor, Ph.D.

The theme of this conference quite clearly reflects the coming of age of research on adolescent drug abuse. Initially focused on epidemiology and the description of trends in illicit substance use, the main body of research soon shifted its attention to the explanation of variation in use, including variation in intensity, in onset and termination of use, and in patterns of association with other drugs and, indeed, with other, non-drug-use behaviors. In a review of a plethora of different studies on the use of marijuana (Jessor 1979), I was impressed with how rapidly a store of explanatory knowledge had been achieved, and how coherent and robust the findings were. Now, only 5 yeors later, the conference papers provide evidence thot drug abuse research has continued to mature and that its more recent accomplishments are, once again, extremely impressive.

There are numerous signs in the papers that a new stage of development in drug abuse research has been reached. Salient among these are: the capability to bring to bear empirical data, collected at the same time, in explaining shifts and changes in trends of adolescent drug use; the shared awareness, implemented in several of the research designs, that drug use is not an isolated behavior but one that covaries with ond is embedded in a complex of other behaviors; the accumulation of detailed information about the natural course of development of drug use beyond adolescence and the establishment of the age of highest risk for onset of use; the growing consensus that early onset of drug use has reverberating implications for later patterns of use and abuse; and, of course, the remarkable increase in methodological sophistication ranging from long-term, followup designs, to systematic process and outcome evaluation of interventions, to analytic models relying on life tables and hazard functions.

Most salient as a sign of maturity, however, is the fact that each of the papers has something systematic to say about bridging the gap between what has been learned about drug abuse and what can be done to prevent it. All of the authors are Janus-faced, looking in the direction of explanation or understanding and, simultaneously, in the direction of intervention or change. That the knowledge base has advanced to this stage--one where it is no longer thought premature and, instead, is seen as entirely

reasonable to draw out the implications of etiology for prevention--is what marks most clearly that drug abuse research has come of age.

Finally, one cannot read these papers without a strong sense that they hove something valuable to return to the field of adolescence as a whole. In the earlier stage of research, most investigators combed the literature on adolescent development to inform their own efforts to understand drug use; now those efforts have themselves generated new knowledge--about transitions, about stages and sequences, about peer modeling and involvement, about values and beliefs, and about patterns of behavior--that has enriched our understanding of adolescence and more than repaid the eorlier debt. That, too, is a mark of maturity.

Each of the four papers I have been asked to comment upon has its own contribution to make and stands securely on its own feet. At the same time, the papers tend to converge on several important points or, at least, to reinforce one another on key issues. I think it best to comment briefly on each paper individually in the order in which it was presented--Johnston, Kandel and Yamaguchi, Robins and Przybeck, and Murray and Perry--and then to conclude with a few convergent notions at the end.

The paper by Lloyd Johnston, while brief, is provocative and perhaps even courageous. Its main thesis--that the provision of information can be influential in changing behavior--tends to fly in the face of what is currently the conventional wisdom in the field. Before trying to appraise the support for that thesis, it is worth taking note of the broader contributions that Johnston's paper contains. First, it harvests some of the trend information from the exceptionally valuable annual surveys of graduating high school seniors in the Monitoring the Future Study. These have shown, for example, that the age of onset illicit drug use, including marijuana, has decreased over recent years, and this already suggests that an earlier age level than previously considered may be a more appropriate one for intervention/prevention efforts. Second, the paper shows that trends in explanatory variables can be used to interpret trends in use, a particularly salutory aspect of those annual surveys. Finally, it argues, and I believe convincingly, that the information derived from such surveys can constitute relioble and credible content for prevention programs: information about the normative behavior of peers that can "correct" the demonstrated tendency of adolescents to overestimate the use of drugs by other adolescents; information about the normative values of peers that shows less peer approval for illicit drug use than most adolescents perceive; information about peer images of drug users thot ore more unfavorable than may be expected by many adolescents; and information about the problems that adolescents report as having resulted from their use of drugs, again more prevalent than many adolescents believe.

That such information can be a valuable part of a broader effort to prevent the onset of drug use or to lessen involvement with it would be difficult to gainsay. However, the consensus among most researchers is that information alone is not effective in influencing behovior, and that negative information or "scare tactics" are especially ineffective. In trying to dispel this perspective, Johnston builds an argument for the role of "perceived harmfulness of drug use" as having influenced the drop in regular marijuana use. (Daily use by high school seniors dropped from 10.7% to 5.5% between 1978 and 1983.) Ruling out changes in other factors such as availability, he

shows that the decline in daily marijuana use was accompanied by major increases in perceived peer ond personal disapproval of regular marijuona use and in the perception of "great risk" of harm to the regular user. His conclusion is that these data support the notion that beliefs about the harm of regular marijuana use " . . . had a lot to do with the changes in use at that level."

Although the argument is, indeed, plausible, there are several reasons why it is not yet compelling. First, of course, is the fact thot the data available cannot establish the direction of the relation between the change in beliefs and the behavior change; it remains quite possible that regular use of marijuana declined and beliefs obout its harmfulness subsequently increased rather than the other way around. Second, the consonance of changes in beliefs about harmfulness and changes in regular use is demonstrable only at the aggregate level; what remains a challenge is to demonstrate such consonance at the individual level, and that, of course, requires intra-individual data over time.

Third, and finally, it is possible to entertain an equally plausible alternative hypothesis to account for both the increased perception of harm from regular *use* and the actual decline in regular use, namely, that there hos been an increase in the general conventionality of adolescents during this same historical period. Such an increase in conventionality would lead to less motivation to use marijuana or to seek its effects, and would also imply greater receptivity to messages from authorities about the harmfulness of drug use. In figures 12a and 12b, it is clear that the item, "Don't feel like getting high," is among the top ones endorsed by abstainers from and quitters of marijuana use in 1983, and is as high for the quitters as either of the perceived harm items. Since getting high refers to one of the key motivations of the hang-loose counterculture, the endorsement of that item may well be mirroring the general shift away from unconventionality that is apparent in contemporary adolescents. It would hove been very illuminating to have been shown plots of change in endorsement of that item over time, just as was done for the two harm items in figures l2c and l2d.

These orguments are not meant to refute Johnston's principal thesis but to indicate that considerably more compelling evidence is needed to confirm it. As a matter of fact, I would want to endorse the emphasis in his paper on the importance of health beliefs (I would stress the importance of personal value on health, as well), and the role that information provision may play in shaping those beliefs. More research is obviously needed on how information can be most influential in contributing to behavior change and, in putting forth his thesis, Johnston alerts us that the topic may have been foreclosed prematurely. Reopening it may well yield sizable benefits to the prevention field.

The Kandel and Yamaguchi paper is a richly detailed report of a followup study, through age 25, of cohorts initially assessed in grodes 10 and 11. In order to reconstruct the natural history of each individual's drug experience, they devised a method that yielded retrospective information on a month-by-month basis, information for more detailed than ony heretofore available. With such precise dating of drug initiation, they are able to pursue several objectives of major importance to the understanding of drug use behavior. The data enable the specification of the periods of highest

risk for the initiation of various drugs, and it is illuminating to see that rates of initiation into both alcohol ond marijuana peak at about age 18. Further, the data disclose thot a decline in use of alcohol and illict drugs begins in the middle twenties. The data also permit a much more rigorws estoblishment of the sequential order of progression into the various drugs or classes of drugs. Thus, they provide strong support for Kandel's long-time emphosis on the existence of stoges of drug use ranging from the early use of licit drugs, to later illicit drug use, and now including prescribed psychoactive drugs as well.

The contributions of the paper lie not only in these relatively unique data nor in the important findings they hove yielded about periods of risk for initiation or about stages of progression across the various drug classes; a further contribution consists of the opplicotion of relatively novel and powerful analyticol methods to that data set. Given the refractory nature of time-extended data, the employment of hazard functions, event history analysis, and specially modified Guttman scaling must be seen as pioneering in the drug field.

With these contributions well in mind, and with their implications for bracketing the optimal time and/or stoge for intervention not overlooked, there ore a number of important issues thot moy usefully be roised about the work itself. The first of these has to do with the quolity of the data thot were collected through the use of detailed charts with reliance on long-term, retrospective recall. Given the apparent robustness of the findings, one might be ternpted to accept the retrospective informotion on drug initiotion as, indeed, providing "exact timing" and, hence, reliable ordering. Yet the interval for the retrospective recall was long (10 years or more), during a rapidly changing period of the life spun, the salience in memory of drug initiotion, especially for such a variety of drugs, is questionoble (unlike, perhaps, the salience of sexual initiation), and the month-by-month requirement for reporting is exceedingly demanding of recall. In their own footnote 4, Kandel and Yomaguchi document the substantial discrepancies found between reports from 1980 and reports from 1971 about initiotion of the same behavior. Our own research some years ogo showed a large degree of unreliability of reports of initiation of alcohol use when the some question was asked only I year later of junior high school youth (who ore much closer to the event thon Kandel and Yamaguchi's 25-year-olds). Whot this all odds up to is some concern for the reliability of the retrospective data. That concern could be somewhat mitigated were evidence available from even a modest test-retest reliability study showing that such reports ore, at least, stable and consistent in 1980.

The new support that Kandel's notion of stages of drug use receives from these data, while impressive, should stimulote us to ask further questions about the sequential structure of drug initiation and even obout developmental stages more generally. The focus of the stoges and sequence research has thus for been on use rather thon on abuse or heavy or problem use. Yet it seems reasonable to speculate that progression in the drug sequence may be more driven by heovy involvement with the prior drug than by mere use of it alone. Perhaps it is time, then, for research on stoges of drug use to encompass more differentiated measures of involvement with a drug in order to begin to establish a more differentioted sequence of progression, one that simultaneously incorporates the stoge of use of a drug and the stage of abuse (or heovy use) of that same drug. Our

own effort toward this end showed that while marijuana use was further along a dimension of involvement with drugs thon alcohol use, it was not as for along as problem drinking (Donovan and Jessor 1983).

Perhaps it is also time for an even more radical expansion of stage and sequence research beyond the preoccupation with drugs alone. We already know--and these popers reinforce that knowledge-that drug use and abuse covary with a variety of other developmentally significant adolescent behoviors, including antisocial behoviors and sexual activity. These other behoviors moy well hove major significance in the sequential patterning and even the timing of drug progression. The application of the stages/sequence porodigm to this larger class or syndrome of adolescent behoviors might significantly enhance our understanding of drug use stages and progression. Beyond that, it should provide a more general understanding of the stages of adolescent development as a whole. Such knowledge is essential if prevention efforts are to be designed in a developmentally sensitive way.

The most problematic aspect of the Kandel and Yamaguchi paper, as they are fully aware, is the attempt to establish predictors of progression from one stage of drug use to the next. Despite the usefulness of event history analysis, the difficulties in the data would seem to attenuate strong conviction about the findings. Nearly a quarter of the total cohort was eliminated since it had initiated marijuana use prior to 1971 when the time-constant, antecedent variables were measured. These are, unfortunately, the early initiators, a subsample much more likely to become heavily involved with drugs thon later initiators. Further, the psychosocial antecedents were measured only once, at a time that turns out to be two and one-half years before the average time of initiation into marijuana use; their usefulness as controls in the analyses reported is severely limited by the fact thot they were not measured at time of initiation.

More bothersome thon the data problems, perhaps, is the sense that the causal vector of progression is being ottoched to the prior drug initiation itself. Although it is clear that prior drug initiation is a "risk factor" for progression (that is, it increases the probobility of later drug initiation), it does not provide on account for and cannot constitute a sufficient cause for further progression. Whot seems clearly needed, at this point, is further work of the sort thot Kandel has already begun, work thot seeks to achieve a social psychology of progression. Such research would need to include a brooder array of predictor variables thot are theoretically relevant to drug initiation; it would need measures of predictors that are gotten close in time to drug initiation; and it would need measures of change in those predictors consequent upon drug initiation. With stages and sequence of drug use now well established, achieving a social psychological understanding of progression should be high on the research agenda. Despite the limitations noted in the present analyses, an impressive beginning has already been mode.

In considering the implications of their findings for prevention, Kandel and Yamaguchi stress the importance of efforts to reduce initiation into the use of cigarettes and alcohol as a woy of reducing later initiotion into the use of marijuana. That conclusion is based on the evidence that progression to later stage drugs rests heavily on the initiation of earlier stage drugs. Since this same conclusion emerges in several of the papers at the conference, I will postpone further discussion of it until later. Meantime, it

need hardly be stressed thot this paper as a whole has deepened our understanding of the natural history of drug use behavior and has thereby contributed to a much sounder basis for developing strategies for prevention.

The Robins and Przybeck paper begins with on important distinction thot has too often been elided in discussions of the prevention of illicit drug use --the distinction between use and abuse. Drowing from the exceptionally important data collected as part of the five-site Epidemiological Catchment Area Progrom, the authors are in a unique position to pursue on investigation of the problem use or abuse of a variety of drugs, since assessments of both drug dependence and abuse were mode in the intensive interviews employed. A major, initial contribution of this effort is the epidemiologicol information it provides on lifetime prevalence of drug abuse and dependence in representative population samples aged 18 and over. Also important is the clear evidence it provides about the covariation of drug problems with other behavior problems, including alcohol abuse, tobacco dependence, and antisocial personolity.

However, the key contribution thot Robins ond Przybeck make--at least from the standpoint of its bearing on prevention--is the demonstration that age of first use of a drug is a powerful predictor of later drug problems. Among mules, for example, the proportion thot later developed some level of drug problem was 50% for those initiating before age 15, 26% for those initiating between 15 and 17, 17% for those initiating setting between 18 and 24, and 11% for those initiating at age 25 and older--a striking monotonic decrease in risk as age of onset increases. Age 15 appears to be something of a watershed in magnitude of risk.

Given the importance of the timing of initiation into drug use, the authors sought to establish its predictability and, again, the findings are valuable. Among the voriety of antecedent factors that increased risk for initiating drug use, whatever the age category, the most powerful precursor was "getting drunk." This reinforces the point made earlier, in relation to Kandel's sequences of drug use, thot it is now time to consider heavy use or abuse of a drug as a separate step in drug progression.

With respect to prevention strategy, Robins ond Przybeck infer from their findings that efforts should be torgeted on delay of onset or postponement of drug use initiation until age 18 or later when risk for developing later drug problems has sharply dropped. Such a prevention strotegy is provocative since its focus is on preventing drug problems rather than drug use, and it acknowledges the fact thot illicit drug use among the young is commonplace and--as Johnston's data show for marijuana--modal behovior. The importance of such a perspective for both policy ond implementation cannot be minimized. It has been urged elsewhere by others (e.g., Jessor 1982), and it will be returned to later in this paper.

The exceptional value of the Epidemiologicol Catchment Area Program data is already obvious from even the brief glimpse the outhors hove given us of their early analyses. On the basis of what we hove seen thus fur, several issues are worth raising with Robins and Przybeck. First, there is the some issue thot was brought up earlier with Kandel ond Yamaguchi about the heavy reliance on long-term (in this case it could be 20 years or more), retrospective reports about the timing of a large variety of behavioral events. Clearly there is no feasible alternative in establishing the

temporal order of life experiences than to ask respondents when they occurred over some post time interval. Nevertheless, when whot is being asked ore such items aS age of first experience of truancy, or of lying a lot, or age of first drug problem--and when they ore osked of respondents in, say, their early thirties--the reliability of the answers needs more buttressing than we have been given.

Another concern has to do with the "psychiatrization" of drug problems implicit in the reliance of the research on the DSM-III nosological categories. How useful this is is questionoble since the respondents are a general populotion sample rather than a clinical sample, and the explanatory contribution of psychopathology to voriotion in drug use and abuse in such populotions has been slim. The demonstrated linkage between so-called drug disorders and "other psychiatric disorders" in this research simply turns out, with some exceptions, to implicate other behavioral domains: alcohol abuse, tobacco dependence, and antisocial behavior. Whether calling them psychiatric disorders is helpful or, instead, represents on unwarranted insinuation of a particular interpretive perspective clearly needs more explicit consideration.

A third issue of interest is the luck of success the authors had in accounting for the development of drug problems (other than by early age of onset). Almost none of the factors that predicted onset of drug use predicted drug problems. The elusiveness of risk factors for drug problems is challenging. A glance at the 15 factors (table 6) that predicted drug onset but not drug problems suggests thot they are, in large part, behaviaral or demographic precursors, and what is lucking almost entirely is the domain of psychosocial attributes that could, theoretically, implicate problem proneness. It is not possible to moke a strong argument that these would turn out to be useful as risk factors for drug problems, and the absence of measures of such variables in the present data preclude their testing. However, in our own work (Jessor 1984), we have found that antecedent, psychosocial proneness to problem behavior in adolescence is predictive of problem drinking in young adulthood for both adolescent problem drinkers and nonproblem drinkers.

Finally, the Robins-Przybeck paper confronts us with a puzzle that one hopes the authors will consider further in their future work. The puzzle is why delay of onset of drug use should turn out to be "protective" against the later development of drug-reloted problems. Is it thot later initiators ore more mature ond hence skilled in delimiting their use of drugs in more appropriate ways? Is it thot by starting later they have evaded involvement with a problem prone peer group? Is it that late starters are more conventional ond thus less likely to transcend other normative boundaries? what we still lack, unfortunately, is an understanding of the social psychology of deloy; any advance in that direction would be of benefit to the design of prevention strotegies. Meantime, the empirical evidence about early onset as a powerful risk factor for later drug problems remains a salient contribution from Robins and Przybeck.

The final paper by David Murray and Cheryl Perry is usefully different from the other three in this section. Rather than presenting new empirical findings, it undertakes two other objectives. One of these is to sweep the various theoretical models in the adolescent drug abuse field for their logical implications for prevention. And the other is to present a particular

prevention program as an illustration of the feasibility of translating and systematically implementing a theoretical perspective in an actual intervention context.

The value of their paper is apparent in several different ways. First, as Robins and Przybeck did, they are careful to entertain the difference between experimental use, regular use, and problem use of drugs. Clarity an these distinctions, particularly for those engaged in actual prevention efforts, is essential if prevention goals are not to be obfuscated. Second, their review of the various theoretical models is especially valuable since, for each approach, they have been able to discern and summarize what it has to say about prevention, either explicitly or implicitly. The cumulative impact of following their analysis is that there is a full harvest to be reaped, and workers in the prevention field would be immensely benefited by familiarity with their discussion. Third, they alert us to a major limitation of most of the extant theoretical models: while they have been relatively successful in explaining adolescent drug use and abuse and in identifying the factors that serve as precursors or correlates, they are essentially mute about how to change those factors. In short, they point out that explanatory work is illuminating and suggestive about relevant risk factors, but what those in prevention/intervention actually require is a knowledge base for changing behavioral, personality, and environmental risk factors. Some such models do exist--attitude change theory, behavior change theory, and communication theory--but this is an arena needing priority attention and much more support.

More important than these contributions, perhaps, are two others that are linked together. The first contribution is their emphasis on the functional meanings of drugs for adolescents, a thread that winds its way through the entire fabric of the paper. In adopting a general perspective that successful prevention/intervention has to be sensitive to the nature of adolescent development, they have sought a particular understanding of the role that drug use plays in adolescent life. To capture that role has required an elaboration of the functions that the use of drugs can serve, for example, to express opposition to authority, to affirm solidarity with peers, to cope with feelings of inadequacy, or to mark the transition out of immaturity. Once such functions are recognized, it is clear that drug use has come to be, for many young people, an important facet of their behavior and development rather than reflecting psychopathology or mere perversity. And this recognition leads to the second of these linked contributions: the emphasis that Murray and Perry place on the concept of alternative behaviors that can serve the same functions as drug use while being less health-compromising and even, in some instances, being health-enhancing. The conceptual salience given to alternative behaviors broadens the prevention/intervention focus beyond the usual parochialism of trying merely to eliminate or reduce a particular behavior--the use of drugs.

Most important of all as a contribution, because it represents the only instance of this sort in the various papers, is the concrete description of the intervention program these authors currently have underway to implement systematically their ideas about functional meanings and alternative behaviors--a program called "Amazing Alternatives." The program constitutes an exemplary instance of the bridging of theory and practice, and it ought to encourage others to approach prevention in an equally systematic way, whatever the conceptual position employed.

Despite appreciation for this general approach to prevention, it is unfortunately the case that empirical evidence of its fruitfulness is still lacking, and judgment of its success must await its completion and evaluation. There are also other limitations that ought to be acknowledged in regard to a focus an functions. It may well turn out that there are no socially acceptable alternatives that can fulfill certain functions that drug use serves for some adolescents, for example, access to sexual gratification. Further, functions constitute only a portion of the significant sources of variance in adolescent drug use. Attempts to change drug use behavior in any substantial way undoubtedly require the incorporation of other conceptual targets for intervention. More comprehensive models for intervention (see Perry and Jessor 1983, for one example) would seem necessary to explore.

Nevertheless, Murray and Perry have brought the attention of the conference much closer to the concern for prevention that has animated all of the participants. In gleaning guidance from etiolagical and change models, and in describing an actual attempt to implement that guidance, they offer encouragement that the bridging of etiology and prevention is a feasible endeavor.

CONCLUDING COMMENT

Several issues cut across the individual papers and, in one way or another, were raised by them. Each issue is germane to the overriding concern of this conference with prevention.

The first issue is about the ambiguity that has surrounded the goals of prevention. It is precisely the recent burgeoning of research an the efficacy of prevention/intervention that has brought this topic out of the shadows and given it new urgency. What the papers make clear is the necessity for distinguishing, at least, between any drug use, regular drug use, and drug abuse or problem use, and such a distinction has immediate implications for targeting what is to be prevented in any intervention program. An exclusive emphasis on abstinence or on the prevention of any drug use needs to give way to a mare qualified and differentiated perspective. The goals of prevention efforts should reflect whether the drugs are licit or illicit, whether, if illicit, they are rarely used or well-institutionalized and modal in contemporary society, whether any use or only heavy use is known to be health compromising, whether use is age graded and prohibited only for those below a certain age, etc. A more differentiated specification of preventian goals, and an elaboration of multiple goals, is what is suggested by the epidemiological and etiological findings the papers have generated.

One such prevention goal that is different from abstinence is the delaying of onset of drug initiation, a goal particularly stressed in the Robins and Przybeck paper. Since the evidence seems clear and compelling that early onset is a strong risk factor for later drug problems, delay of onset would seem to promise a more benign course for lifetime drug experience. Older youth can be expected to have greater skills and more resources for managing the place of drugs in their lives. Further, delay as a goal for illicit drug use would parallel the situation for licit drugs such as alcohol to which access is permitted after an institutionalized delay established by law.

What remains a problematic issue, however, is our continuing lack of understanding about just why delay is insulating against later problems. Is it the delay itself or the factors that account far the delay that minimize the risk of subsequent problems? The goals and strategies of prevention efforts might well be different depending on the answer to that question.

Another issue worth further thought is one that emerges from the research on stages and sequence of drug initiation. The conclusion drawn, too readily I fear, is that prevention efforts should be targeted on drugs early in the sequence--tobacco and alcohol-and that would reduce initiation into drugs later in the sequence, such as marijuana. There is a bit of faulty logic here--just because things are organized in sequence does not permit the inference that eliminating an earlier stage will eliminate all the later ones. Indeed, the situation is more complex than that. For example, if the Murray-Perry emphasis on the important functions that drug use serves in adolescence is taken seriously, then precluding the earlier drugs in the sequence from serving those functions could quite logically increase involvement, and even earlier involvement, with later-staqe drugs. Rather than focusing on how early in the sequence of organized behaviors we should try to interrupt the chain, it would seem more appropriate to consider how olternative behaviors can be substituted for those that are in the sequence, alternative behaviors that are less health-compromising, less problem prone, and that can fulfill some of the same functions. The main point here is simply that targeting a reduction in licit drug use may or may not have reverberating consequences for reducing illicit drug use; the outcome would depend quite heavily on what else was done rather than on the sequential structure per se.

The evidence in these papers that the use of drugs is part of a cluster or syndrome, or constellation of other problem behaviors is a final issue that has implications for prevention. It raises questions not only about prevention efforts that focus only on a particular drug, say tobacco use or marijuana, but also about efforts that focus on drug use in general rather than on the larger set of problem behaviors as a whole. This is clearly an area in which further knowledge is urgently needed in order to increase the effectiveness of drug prevention strategies. Mare knowledge is needed about the perimeter around the problem behavior syndrome--does it extend far enough, for example, to encompass negative correlations with health-enhancing behaviors such as regular aerobic exercise? And more knowledge is especially needed about what the best mix is of drug-specific prevention strategies (e.g., teaching skills to say no to peer pressure to smoke) and more general prevention strategies oriented toward changing overall lifestyle (e.g., increasing the adolescent's value on health and concept of self as health conscious).

The richness of the papers I was asked to discuss ought to be evident by now. They have generated myriad implications for prevention and, in that way, have shown how far research has come in the drug abuse field in such a short period of time. If there is not yet a marriage of etiological research and prevention research, it is clear that the relationship is more than a casual affair.

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Implications of Etiological Research for Preventive Interventions and Future Research

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As indicated in the introductory chapter, prevention research is comprised of two basic areas. The first, etlologic research, seeks to identify factors which either place indivlduals at increased risk for drug use or protect them against such risk. The identification of such factors serves to identify populations at risk for drug abuse, so that preventive intervention programs can be targeted to appropriate individuals, and to guide the development of relevant, effective programs. The second area, preventlve intervention research, develops and tests interventlon strategies to prevent the onset of drug use behaviors and to intervene early in the course of experimentatlon with drugs.

This monograph has examined these two areas of prevention research and their interrelationship. The preceding chapters have provided indepth reviews of specific research areas by leading experts in these fields of research. A substantial body of knowledge about the etiology of drug use and abuse has accumulated, and prevention program developers increasingly look to this body of knowledge for guidance. The extent to which etiological research has influenced the development of prevention programs is evident in the chapters by Hawklns and his collegues and by Murray and Perry. The overall impression, however, is that much remains to be clarified about the etiology of drug use and the implications for preventive Interventions. Prevention program developers and concerned parents are eager for more Information on how to prevent drug abuse effectively. Thus, additional research relevant to prevention is a priority.

This concluding chapter is not intended to summarize the wealth of information presented, but to highlight major themes, identify implications for preventive interventions, and present recommendations for future research.

MAJOR THEMES

A central theme is that drug use is not a unitary phenomenon. Drug use includes a variety of substances which are used

independently, sequentially, or concurrently, and with varying degrees of intensity. The majority of drug users do not become chronic drug abusers, i.e., they experlment with drugs a few times and discontinue use or they continue to use drugs only occasionally. For the majority of drug users, use is a transitory phenomenon. Kandel and Yamaguchi report that only 25% of youth who have experimented with drugs are still using drugs at age 23. Yet, a sizeable minority of users become seriously involved with drug use and continue use for many years. Factors adding to the diversity of the drug use phenomenon stem from the heterogeneity and interplay of cultural, environmental and socioeconomic factors in the United States which generate distinctly different patterns of drug use. Socioeconomic status within groups is probably one of the most significant factors (e.g., use of specific drugs, such as use of solvents by persons of generally lower socioeconomic status). The types and routes of administration of drugs are also remarkably subject to acculturation within a cohort. A number of the authors (Hawkins et al.; Baumrind) have pointed out that the route to drug abuse includes multiple phenomena, each with its own distinct etiological roots.

Related to this theme, a second theme concerns the importance of distinguishing between different categories of drug users. For example, the papers by Robins and Przybeck and by Hawkins and his colleagues point out that there has been relatively little effort to distinguish drug use from problem use or drug abuse. Most attention has been focused on initiation and addiction, with relatively little attentlon given to factors related to escalation, maintenance, or cessation of drug use. The ability to differentiate the etiological origins which pertain to various patterns of use and to various cultural and ethnic groups is limited. The ability to differentiate patterns of risk is critical if various drug abuse phenomena are to be understood clearly and if prevention programs are to be appropriate and targeted toward their intended audiences.

Two interrelated themes concern the extent to which risk factors have been identffied and the extent to which identified risk factors are understood. Although etlological research has identified a number of important risk factors, particularly those relevant to the adolescent period of development, as Hawkins and his colleagues point out, relatively little attention has been focused on identifying risk factors which emerge during early childhood and preadolescence. Bush and Iannotti point out that there has been little research on the development of children's health orientations and behaviors. Also, much etiological research has depended on survey methods with large samples. This approach has successfully identified key risk factors, but not the processes whereby they are interrelated. Shore's discussion of the complexities of various factors and the interactions among them indicates the degree to which the processes leading to drug abuse have not been clarified. In effect, etiological research has been able to point out general

areas appropriate for preventive interventions, but has not been able to focus these efforts with sufficient specificity.

Drug use in America is also a changing phenomenon. The extent of use and attitudes toward drug use change over time. Presumably the meaning and etiology of use are also subject to change. Drug use in the 1950s differs greatly from use In the 1960s, the 1970s, and the 1980s. For example, drug use by youth in the 1950s was highly aberrant behavior whereas experimental use in the late 1970s was behavior typical of a large segment of American youth. Johnston reports that the trends through the 1970s toward increased drug use have shifted dramatically beginning in 1979. Fewer high school seniors have used drugs, fewer seniors approve of regular marijuana use, and seniors increasingly perceive great risk of harm from such use. Johnston suggests that drug abuse information, a prevention approach which was found to be ineffective in the late 1960s and 1970s, may be appropriate today. He cites high school seniors' increased perception of harm related to regular marijuana use, reduced alienation of youth, and secular trends emphasizing healthy lifestyles to support his hypothesis.

Not only does the cultural context change over time, it can also differ from one place to another or from one socioeconomic, racial, or ethnic group to another. For example, Baumrlnd reports a different sequence of stages of drug use in her Berkeley, California, sample than Kandel and Yamaguchl found in their New York State sample. Obviously, drug use must be considered within Its cultural and environmental context, and all findings need to be carefully qualified in terms of their generalizability. Etiological research must be seen as a dynamic process--findings from the past must continually be reexamined to determine their continuing applicability. findings must also be reexamined in relation to differing cultural contexts and target populations within larger groups.

A number of papers generated extensive discussion of the goals of drug abuse prevention. Possible goals were delineated, including the prevention of any use of drugs, regular use of drugs, dysfunctional use or abuse of drugs, use of specific categories of drugs, and delaying use of drugs. While there was no consensus regarding specific emphases among these possible goals, it was generally agreed that prevention could not focus on a single goal. One concern was that a focus on preventing any drug use might lack credibility with some youth and might be ineffective. A second issue was that, given current prevalence, many youth will use drugs; thus, intervention programs need to be prepared to prevent escalation from experimentation to regular use. Programs focused on preventing any drug use may fail to engage youth who have already initiated use.

The selection of prevention goals and the establishment of priorities among them is ultimately a public policy issue, not a scientific issue. The scientific information needed to assist

policymakers in formulating priorities is often lacking. For example, early age of onset of drug use has been clearly established as an important risk factor for dysfunctional drug use (Robins and Przybeck). This suggests that delaying onset is an appropriate goal of prevention, a theme reflected in a number of papers. Ultimately, however, the assessment of delay as a goal requires evidence that is lacking. First, as Jessor points out, it is unclear whether delay itself, or factors which account for delay, minimize risk. It must be established that delaying use does indeed result in decreased levels of subsequent use and negative consequences resulting from use. Second, it must be determined that efforts to delay use can be more effective in preventing dysfunctional use than efforts to prevent any use. Third, it must be determined that there are no unintended effects of efforts to delay use, such as increasing the number of youth who experiment with drugs.

The importance of age of onset is a recurrent theme. Kandel and Yamaguchi point out that the age of onset of alcohol use strongly influences the probability of initiating use of marijuana, and the age of onset of marijuana use influences the probability of initiating use of other illicit drugs and of using prescribed psychoactive drugs. Robins and Przybeck note that youth who begin marijuana use early, before age 15, are at especially high risk for dysfunctional drug use or abuse, whereas later initiators are less likely to progress from experimental to dysfunctional use. As Shore points out, this parallels the development of other types of pathology: the younger the age of onset, the more severe the resulting dysfunction.

The relationship among various drug-using behaviors and between drug use and other associated behaviors is the final theme. Kandel and Yamaguchi examine patterns of initiation to various substances and identify specific stages of progression. Jessor has found that drug use is not an isolated behavior, but is closely interrelated with a complex set of other behaviors. He suggests the need to expand research on stages of drug use beyond the current focus on initiation to include the intensity of use and the occurrence of other problem behaviors. Robins and Przybeck explore the relationship between drug use and psychiatric disorders, concluding that use .initiated abnormally early (before age 15) or abnormally late (late 20s) is closely related to underlying psychiatric disorders. In contrast, most use initiated between ages 15 and 24, the period of greatest risk for drug use onset, appears related to social influences, not underlying psychiatric disorders. Similarly, Hawkins suggests that drug experimentation appears to be a peer phenomenon, while more severe drug abuse appears imbedded in family conflict, school failure, and antisocial behavior.

IMPLICATIONS FOR PREVENTIVE INTERVENTIONS

Although etiological research has provided considerable information relevant to designing and targeting preventive

interventions, such information is often only able to suggest the general focus of interventions. Further etiological research is needed to provide specific guidance for interventions.

A number of implications of etlological research for prevention have been identified. Many of these have focused on specific risk factors which identify targets for individual prevention programs. Examples include personality traits such as rebelliousness and alienation, family factors such as disciplinary procedures and parental involvement with children, peer relationships, and behavioral characteristics such as aggressiveness and conduct disorders. Chapters by Hawkins et al. and Murray and Perry provide comprehensive reviews. A few more global implications also emerged from the papers and from discussion during the meeting which can be briefly summarized:

- Since drug abuse is a diverse phenomenon, with individuals using drugs in different ways for a variety of reasons, no single prevention approach will be effective with all groups. To achieve appropriate programming, prevention programs will need to target specific populations and gain an understanding of the meaning of drug use and the dynamics involved in changing drug use behaviors in each target population.

- Since drug use for most youth is related to social and environmental influences, not underlying psychopathology (Robins and Przybeck), the emphases on identifying social influences to use drugs and developing skills to resist these influences which are found in a number of prevention programs, such as those described by Murray and Perry, seem appropriate. However, for a significant number of potential users--especially early and late initiators who appear to be most at risk for serious, prolonged drug use--prevention approaches will need to go beyond intervening in the social milieu. Programs aimed at these youth may need to address other related behaviors or disorders and intervene at younger ages (Robins and Przybeck; Jessor; Hawkins et al.; Kandel and Yamaguchi; Bush and Iannotti; Shore).

- Adolescent drug use must be considered in relation to the normal developmental challenges of adolescence. For example, Baumrind points out that risk-taking behavior is normal for adolescents. Thus, a reasonable prevention goal would not be to eliminate risk taking and thereby prevent drug use, but to rechannel risk taking to more desirable outlets. Alternate challenges might include wilderness adventures, athletic competitions, and opportunities to develop and use vocational and recreational skills. Similarly, Murray and Perry suggest that drug use is purposeful, that it helps youth deal with normal adolescent challenges. This suggests that prevention programs need to help youth learn alternate strategies for meeting these challenges. Also, since adolescence is a time of indlvlduation. coercive approaches, which frustrate

attempts to gain independence, may stimulate rebellion and increase, rather than decrease, drug use (Baumrind).

- Data regarding age of onset (Robins and Przybeck; Kandel and Yamaguchi) suggest that preventive intervention programs must begin early, well before age 15, if individuals who initiate use early and are most at risk of sustained, problematic use are to be reached (Hawkins et al.). How early these prevention efforts should begin is an open question, although the association of drug use with early conduct disorders (Hawkins et al.) and salience of drug use in the home (Bush and Iannotti) suggest that early childhood may not be too early for populations with specific types of risk factors.

- Because initiation to drug use occurs throughout a wide age range, there is no single "most appropriate" age for intervention. Different types of preventive interventions prior to and throughout the periods of risk are needed, and such prevention programs need to be designed based on knowledge of the developmental age and life circumstance of the persons at risk within the target population.

- The data on stages of drug use (Kandel and Yamaguchi) suggest that the prevention of tobacco and alcohol use may have some effect in preventing use of marijuana and other drugs. However, as Jessor points out, this cannot simply be assumed to be true. Such an assumption needs to be tested and empirically determined. Conceivably, a different effect could result, with youth turning to other drugs as substitutes. Murray and Perry suggest that merely blocking the use of a drug, such as restricting its availability, is not enough. With the Berkeley sample which had just experienced an antitobacco campaign, Baumrind found that use of tobacco did not precede use of marijuana.

- As Johnston suggests, drug information may be an appropriate prevention approach today. However, results reported in this volume suggest that information alone may still not be sufficient unless social factors are taken into account. The importance of information as a component of prevention strategies and the characteristics of effective information approaches have yet to be determined. Guidelines suggested by various authors include the use of credible senders to deliver the information (Murray and Perry; Johnston) and providing information which is relevant to the target audience (Murray and Perry), addresses the audience's values (Baumrind), is unambiguous (Baumrind), is accurate and balanced (Johnston), and is appropriate to the audience's developmental level (Bush and Iannotti).

RECOMMENDATIONS FOR FUTURE RESEARCH

The specific suggestions for future research which emerge from the papers and discussions include a wide range of topics:

- The most striking need Is for closer integration of etiological and preventive intervention research so that the potential for etiological research to shape the development of preventive interventions can be realized.

- Etiological research is needed to clarify risk factors related to specific types of drug abuse. Particularly important is research to differentiate risk factors related to drug use versus compulsive, dysfunctional drug abuse.

- A broad array of possible predictor variables should be studied, with frequent measurement at times when changes in drug use behaviors are anticipated.

- Prospective longitudinal studies, which extend from early childhood through adolescence, are needed to gain a greater understanding of the processes and dynamics of risk factors associated with drug use and abuse. Because of the cost associated with this research, efforts should build on collaborations and preexisting data sets where possible, focus on multiple disorders, and focus on high-risk populations.

- Indepth studies of small samples at high risk should be undertaken to clarify the action and interaction of risk factors. Such studies could occur either in conjunction with, or independent of, studies utilizing large-scale survey techniques.

- Research is needed on ethnic minorities and other groups whose unique cultural traditions and life experiences may contribute to different patterns of risk.

- Research on stages of drug use should be expanded to include measures of intensity of use in addition to onset and to consider other compulsive and problem behavlors which may be integrally related to drug use.

- Populations which have initiated use should be studied to identify factors related to cessation versus continuance.

- Study of persons who appear to be invulnerable to drug use. who are at high risk of drug use but do not initiate, are needed to identify factors which may protect them against drug use.

- Relatively little is known about the relationship between environmental factors and drug use. Research should be undertaken to clarify how environmental factors may contribute to, and protect against, use and to identify processes for change. Such factors would include both community influences and cultural influences at the broader, societal level, particularly influences from the entertainment industry and other mass media.

- Research is needed to clarify the processes by which attitudes toward drug use are developed and by which attitudes result in behavior. Among aspects to be considered are the development of attitudes toward health and illness, the relationship between drug-specific attitudes and more general values, and the influence of social settings on attitudes and behaviors.

- Research is required to determine the appropriate role of drug abuse information in preventive interventions, including clarification of appropriate content and methods of delivery for various audiences.

- Based on etiological research data that are available and the experiences of individuals working in prevention, a variety of prevention strategies, appropriate to specific target groups, need to be developed, refined, and tested. Additional prevention research should address ethnic minority groups, economically disadvantaged groups, school dropouts, and groups whose potential use of drugs derives from factors beyond those of a more social nature. The value of intervening earlier in the lifecycle, in early childhood and preadolescence, requires further exploration.

The long range goal of the National Institute on Drug Abuse is to integrate etiologic and intervention research to prevent drug abuse. Hopefully these proceedings from the research review will be of assistance in enhancing our knowledge and guiding our use of resources to achieve this goal.

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9 NARCOTIC ANTAGONISTS: NALTREXONE PROGRESS REPORT. Demetrios Julius, M.D., and Pierre Renault, M.D., eds. Not available from NCDAI.
GPO Stock #017-024-00521-5 $7.00 NTIS PB #255 833/AS $17.50

10 EPIDEMIOLOGY OF DRUG ABUSE: CURRENT ISSUES. Louise G. Richards, Ph.D., and Louise B. Blevens, eds. Not available from NCDAI.
GPO Stock #017-024-00571-1 $6.50 NTIS PB #266 691/AS $22

11 DRUGS AND DRIVING. Robert Willette, Ph.D., ed. Not available from NCDAI.
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12 PSYCHODYNAMICS OF DRUG DEPENDENCE. Jack D. Blaine, M.D., and Demetrios A. Julius, M.D., eds. Not available from NCDAI.
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13 COCAINE: 1977. Robert C. Petersen, Ph.D., and Richard C. Stillman, M.D.. eds. Not available from NCDAI.
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14 MARIHUANA RESEARCH FINDINGS: 1976. Robert C. Petersen, Ph.D., ed. Not available from NCDAI.
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15 REVIEW OF INHALANTS: EUPHORIA TO DYSFUNCTION. Charles Wm. Sharp, Ph.D., and Mary Lee Brehm. Ph.D., eds.
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16 THE EPIDEMIOLOGY OF HEROIN AND OTHER NARCOTICS. Joan Dunne Rittenhouse, Ph.D., ed. Not available from NCDAI.
GPO Stock #017-024-00690-4 $6.50 NTIS PB #276 357/AS $20.50

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GPO Stock #017-024-00694-7 $7.50 NTIS PB #276 353/AS $29.50

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22 QUASAR: QUANTITATIVE STRUCTURE ACTIVITY RELATIONSHIPS OF ANALGESICS, NARCOTIC ANTAGONISTS, AND HALLUCINOGENS. Gene Barnett, Ph.D.; Milan Trsic, Ph.D.; and Robert Willette. Ph.D.; eds. Not available from NCDAI.
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26 THE BEHAVIORAL ASPECTS OF SMOKING. Norman A. Krasnegor. Ph.D., ed. Reprint of the behavioral section of the 1979 Report of the Surgeon General on Smoking and Health; introduction by editor.
GPO out of stock NTIS PB #80-118755 $17.50

27 PROBLEMS OF DRUG DEPENDENCE, 1979: PROCEEDINGS OF THE 41ST ANNUAL SCIENTIFIC MEETING, THE COMMITTEE ON PROBLEMS OF DRUG DEPENDENCE, INC. L.S. Harris, Ph.D., ed. Not available from NCDAI.
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28 NARCOTIC ANTAGONISTS: NALTREXONE PHARMACOCHEMISTRY AND SUSTAINED-RELEASE PREPARATIONS. Robert Willette, Ph.D., and Gene Barnett. Ph.D., eds. Papers report research on sustained-release and long-acting devices for use with the narcotic antagonist naltrexone. Not available from NCDAI.
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29 DRUG ABUSE DEATHS IN NINE CITIES: A SURVEY REPORT. Louis A. Gottschalk, M.D., et al. Not available from NCDAI.
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30 THEORIES ON DRUG ABUSE: SELECTED CONTEMPORARY PERSPECTIVES. Dan J. Lettieri, Ph.D.; Mollie Sayers; and Helen Wallenstein Pearson, eds. Volume presents summaries of major contemporary theories of drug abuse by each of 43 leading theorists.
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32 GC/MS ASSAYS FOR ABUSED DRUGS IN BODY FLUIDS. Rodger L. Foltz, Ph.D.; Allison F. Fentiman, Jr., Ph.D.; and Ruth B. Foltz. A collection of methods for quantitative analysis of several important drugs of abuse by gas chromatography- mass spectrometry.
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33 BENZODIAZEPINES: A REVIEW OF RESEARCH RESULTS, 1980. Stephen I. Szara, M.D., D.Sc., and Jacqueline P. Ludford. M.S., eds. A RAUS (Research Analysis and Utilization System) Review Report on the abuse liability of the benzodiazepine "tranquilizers."
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38 DRUG ABUSE AND THE AMERICAN ADOLESCENT. Dan J. Lettieri, Ph.D., and Jacqueline P. Ludford, M.S., eds. A RAUS Review Report, emphasizing use of marijuana: epidemiology, socio-demographic and personality factors, family and peer influence, delinquency, and biomedical consequences.
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39 YOUNG MEN AND DRUGS IN MANHATTAN: A CAUSAL ANALYSIS. Richard R. Clayton, Ph.D., and Harwin L. Voss, Ph.D. Examines the etiology and natural history of drug use. with special focus on heroin. Includes a Lifetime Drug Use Index.
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40 ADOLESCENT MARIJUANA ABUSERS AND THEIR FAMILIES. Herbert Hendin, M.D., Ann Pollinger, Ph.D., Richard Ulman, Ph.D., and Arthur Carr, Ph.D. A psychodynamic study of adolescents involved in heavy marijuana use, to determine what inter-action between family and adolescent gives rise to drug abuse.
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41 PROBLEMS OF DRUG DEPENDENCE, 1981: PROCEEDINGS OF THE 43RD ANNUAL SCIENTIFIC MEETING, THE COMMITTEE ON PROBLEMS OF DRUG DEPENDENCE, INC. Louis S. Harris, Ph.D., ed. Not available from NCDAI.
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42 THE ANALYSIS OF CANNABINOIDS IN BIOLOGICAL FLUIDS. Richard L. Hawks, Ph.D., ed. Varied approaches to sensitive, reliable, and accessible quantitative assays for the chemical constitutents of marijuana, for researchers. Not available from NCDAI.
GPO Stock #017-024-01151-7 $5 NTIS PB #83-136044 $1643

43 PROBLEMS OF DRUG DEPENDENCE, 1982: PROCEEDINGS OF THE 44TH ANNUAL SCIENTIFIC MEETING, THE COMMITTEE ON PROBLEMS OF DRUG DEPENDENCE, INC. Louis S. Harris, Ph.D., ed. Not available from NCDAI.
GPO Stock #017-024-01162-2 $8.50 NTIS PB #83-252-692/AS $40

44 MARIJUANA EFFECTS ON THE ENDOCRINE AND REPRODUCTIVE SYSTEMS. Monique C. Braude, Ph.D., and Jacqueline P. Ludford. M.S., eds. A RAUS Review Report of animal studies and preclinical and clinical studies of effects of cannabinoids on human endocrine and reproductive functions.
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45 CONTEMPORARY RESEARCH IN PAIN AND ANALGESIA, 1983. Roger M. Brown, Ph.D.; Theodore M. Pinkert, M.D., J.D.; and Jacqueline P. Ludford, M.S., eds. A RAUS Review Report on the anatomy, physiology, and neurochemistry of pain and its management.
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46 BEHAVIORAL INTERVENTION TECHNIQUES IN DRUG ABUSE TREATMENT. John Grabowski, Ph.D.; Maxine L. Stitzer, Ph.D., and Jack E. Henningfield, Ph.D., eds. Reports on behavioral contingency management procedures used in research/treatment environments.
GPO Stock #017-024-01192-4 $4.25 NTIS PB #84-184688/AS $16

47 PREVENTING ADOLESCENT DRUG ABUSE: INTERVENTION STRATEGIES. Thomas J. Glynn. Ph.D.; Carl G. Leukefeld, D.S.W.; and Jacqueline P. Ludford, M.S., eds. A RAUS Review Report on a variety of approaches to prevention of adolescent drug abuse, how they can be applied, their chances for success, and needed future research.
GPO Stock #017-024-01180-1 $5.50 NTIS PB #85-159663/AS $22

48 MEASUREMENT IN THE ANALYSIS AND TREATMENT OF SMOKING BEHAVIOR. John Grabowski. Ph.D., and Catherine S. Bell, M.S., eds. Based upon a meeting cosponsored by NIDA and the National Cancer Institute to delineate necessary and sufficient measures for analysis of smoking behavior in research and treatment ettings.
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49 PROBLEMS OF DRUG DEPENDENCE, 1983: PROCEEDINGS OF THE 45TH ANNUAL SCIENTIFIC MEETING, THE COMMITTEE ON PROBLEMS OF DRUG DEPENDENCE, INC. Louis S. Harris, Ph.D., ed. A collection of papers which together record a year's advances in drug abuse research; also includes reports on tests of new compounds for efficacy and dependence liability.
GPO Stock #017-024-01198-3 $12 NTIS PB 85-159663/AS $22

50 COCAINE: PHARMACOLOGY, EFFECTS, AND TREATMENT OF ABUSE. John Grabowski, Ph.D., ed. Content ranges from an introductory overview through neuropharmacology, pharmacology, animal and human behavioral pharmacology, patterns of use in the natural environment of cocaine users, treatment, through commentary on societal perceptions of use.
GPO Stock #017-020-01214-9 $4 NTIS PB 85-150381/AS $14.50

51 DRUG ABUSE TREATMENT EVALUATION: STRATEGIES, PROGRESS, AND PROSPECTS. Frank M. Tims, Ph.D., ed. A state-of-the-art review of drug abuse treatment evaluation, identifying research needs, promising approaches, and emerging issues.
GPO Stock #017-020-01218-1 $4.50 NTIS PB 85-150365/AS $17.50

52 TESTING DRUGS FOR PHYSICAL DEPENDENCE POTENTIAL AND ABUSE LIABILITY. Joseph V. Brady, Ph.D., and Scott E. Lukas, Ph.D., eds. Describes animal and human test procedures for assessing dependence potential and abuse liability of opioids, stimulants, depressants, hallucinogens, cannabinoids, and dissociative anesthetics.
GPO Stock #017-024-0204-1 $4.25 NTIS PB 85-150373/AS $16

54 MECHANISMS OF TOLERANCE AND DEPENDENCE. Charles Wm. Sharp, Ph.D., ed. Review of basic knowledge concerning the mechanism of action of opiates and other drugs in producing tolerance and/or dependence.
GPO Stock #017-024-01213-1 $8.50 NTIS PB No. to be assigned.

55 PROBLEMS OF DRUG DEPENDENCE, 1984. PROCEEDINGS OF THE 46TH ANNUAL SCIENTIFIC MEETING, THE COMMITTEE ON PROBLEMS OF DRUG DEPENDENCE, INC. Louis S. Harris, Ph.D., ed.

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53 PHARMACOLOGICAL ADJUNCTS IN SMOKING CESSATION.
John Grabowski, Ph.D., ed.

57 SELF-REPORT METHODS OF ESTIMATING DRUG USE: MEETING CURRENT CHALLENGES TO VALIDITY. Beatrice A. Rouse, Ph.D., Nicholas J. Kozel, M.S., and Louise G. Richards, Ph.D., eds.

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Theodore M. Pinkert, M.D., J.D., ed.

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