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SPECIAL ARTICLE

THE NONTHERAPEUTIC USE OF PSYCHOACTIVE DRUGS

A Modern Epidemic

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Abstract The current widespread nontherapeutic use of psychoactive drugs began among a small group of college students in the early 1960s. It spread with explosive force into an epidemic of extraordinary scope involving all regions of the country, all socioeconomic classes, and all age groups. This article reviews the drugs currently used and identifies those who use them. It discusses the complex, rapidly changing patterns of use and the consequences of this epidemic for both the individual and the society.

The inhalants, phencyclidine, cocaine, heroin, the psychotherapeutics (methaqualone and amphetamine), and marijuana are the most widely used drugs. Recent clinical and laboratory research indicates that these

drugs pose serious hazards to physical and mental health.

Marijuana is the most widely used illicit drug; one quarter of the entire U.S. population have used the drug, and 20 million people use it daily. The short-term and long-term adverse effects of marijuana have important social implications.

Recent data suggest that drug users possess limited inner resources to cope with psychological stress and that they take drugs to fill a moral and spiritual void and to meet intense emotional needs. It is proposed that these character traits and emotional conflicts of drug users may reflect recent changes in child rearing and family stability. (*N Engl J Med* 1983; 308:925-33.)

WHEN future historians study American culture, they may be most perplexed by the explosive increase in the nonmedical use of drugs that occurred during the seventh and eighth decades of this century.¹⁻¹¹ This widespread increase in the illicit use of psychoactive drugs began in the early 1960s, primarily in colleges and universities, during an era of unprecedented campus disorder and social upheaval. For the next 10 years studies were focused on patterns of drug use among college students — the late-adolescent and young-adult age groups. Perhaps because of the strong influence youth exerts in establishing the tone of our culture with respect to music, dress, and life style, the nonmedical use of drugs spread rapidly to other age groups, and during the 1970s it reached epidemic proportions. Public concern over this phenomenon resulted in the appointment of presidential committees, the passage of legislation, and the funding of research by

the federal government. Sometimes interpretation of data from this research led to scientific controversy and to public confusion rather than enlightenment. In the case of one widely used drug, marijuana, the Department of Health and Human Services deemed it necessary to contract with an independent, nongovernment agency, the Institute of Medicine of the National Academy of Sciences, to review the data and, if not resolve the controversy, at least reduce the confusion.^{2,3} During the same year, the World Health Organization contracted with the Canadian Addiction Research Foundation to conduct a similar study.⁴

Now that we have entered the 1980s and the campus riots and political turmoil of the 1960s and early 1970s have subsided, has this tendency to use drugs also subsided? What drugs are currently the most widely used? How many people use them? What are the patterns of use? Do those who take drugs have characteristic behavioral and personality traits? Has recent research shed new light on the hazards that these drugs pose? Because of the large number of mis-

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interpreted and apparently conflicting research findings in the literature, misleading information in the media, and above all, the complex and constantly changing pattern of drug use among different age groups, physicians have difficulty answering these questions and keeping themselves and their patients informed.¹⁻¹¹

Recent extensive surveys indicate that the inhalants, phencyclidine, cocaine, heroin, the psychotherapeutics, and marijuana pose the greatest potential danger. Because of space limitations, only marijuana, the most widely used of all illicit drugs, will be discussed extensively. This article focuses on the drugs that are used; on the people who use them; on the trends, patterns, and psychosocial antecedents of use; and on the consequences of use for both the individual and society.

INHALANTS

Inhalants, a diverse group of chemicals producing psychoactive vapors, have become extremely popular over the past eight years. On the basis of recent surveys, federal drug authorities estimate that 1 in 10 people under 17 years of age and a total of 7 million Americans have experimented with these substances.^{10,12} Inhalants act as powerful central-nervous-system depressants and produce an intoxication that is similar to alcohol but of shorter duration. The immediate and transient effects, which last from 5 to 45 minutes after cessation of sniffing, range from excitation, loss of inhibition, and a sense of euphoria to symptoms of acute organic brain syndrome — dizziness, amnesia, inability to concentrate, confusion, and ataxia. Impaired judgment, a sense of reckless abandon, omnipotence, and acute psychosis with delusions and hallucinations (both visual and auditory) have also been reported. Toxic effects differ according to the dose and the specific chemicals used. Although the toxic effects of most inhalants are considered transient and minimal, several deaths resulting from the intentional inhalation of aerosol sprays have been reported. This "sudden-sniffing-death" syndrome appears to be related to the tendency of fluorocarbons (particularly trichlorofluoromethane) to potentiate the effect of epinephrine on the heart, resulting in heart failure and death. Though the need for higher doses to produce the desired effect (tolerance) occurs with most inhalants, no evidence exists for physical or psychological dependence.¹³ Popular inhalants include glue; coolants; paint thinner; nail-polish remover; gasoline; transmission fluid; and many substances in aerosol cans, such as hair spray and room deodorizers. Amyl nitrite, nitrous oxide, and halothane are also popular among adolescents. Methods of inhalation vary with different youth groups, the most common being to inhale fumes in a plastic bag. This method has resulted in a number of deaths from suffocation.

A national survey on drug abuse reported that by 1980 the lifetime prevalence of inhalants (the proportion of people who had ever used inhalants) was 9.8 per cent among youths (12 to 17 years old), 16.5

per cent among young adults (18 to 25 years old), and 3.9 per cent among older adults.¹⁰ Although no significant change occurred among youths in lifetime prevalence between 1977 and 1979, significant increases did occur during this period among young and older adults. Recent surveys of high-school seniors have shown a lifetime prevalence of 18 per cent.⁶ Men outnumber women 10 to 1, blacks are underrepresented, and Hispanic and native Americans are overrepresented in the use of inhalants.

Studies of inhalant-use patterns indicate that whereas experimentation — that is, trying an inhalant once or a few times — is extremely common among young people, regular users are found primarily among lower socioeconomic groups, among children of alcoholic parents, among abused or neglected children, and among children from unstable and disorganized homes. Inhalant abusers are usually not part of a drug subculture.¹³ The overall trend in the use of inhalants has been a dramatic increase during the 1970s in most age groups and a leveling off during the 1980s among high-school seniors. Lifetime prevalence rates for the classes of 1979, 1980, and 1981 were 18.7, 17.6, and 17.4 per cent, respectively.⁶

PHENCYCLIDINE HYDROCHLORIDE

Phencyclidine has come to public attention relatively recently and is of major concern to health officials because of its popularity among young adolescents and its association with violent behavior and bizarre deaths. Synthesized 50 years ago, the drug was marketed in the United States in 1963 as a nonbarbiturate, non-narcotic anesthetic agent for use in human beings. It was withdrawn two years later because of post-operative reactions, such as agitation, delirium, hallucinations, muscle rigidity, and seizures. During the past 15 years, the only legal uses of the drug have been in veterinary medicine. Belonging to the cyclohexylamine family of chemicals, the drug has scores of street names, perhaps the most common being "angel dust" and "hog." Snorted, smoked, or ingested, phencyclidine may act as a depressant, a stimulant, or a hallucinogen, depending on such variables as route of administration and dosage. Low doses may produce paranoia and perceptual distortion, high doses catalepsy and convulsions. Some psychiatric emergency units in urban hospitals have reported that in up to 70 per cent of their admissions the urine has been positive for phencyclidine. In 1979 over 300 deaths apparently resulted from behavioral toxicity caused by the drug.¹⁴ Because minimal doses of phencyclidine induce a vestibulocerebellar syndrome characterized by the sensation of weightlessness, nystagmus, and muscular incoordination, death may be caused by drowning or by injuries sustained in an automobile accident or another type of trauma, without the role of the drug being detected.¹⁵

Authorities believe that the prevalence of phencyclidine use and associated deaths far exceeds the number reported. In the general population studies of lifetime

prevalence indicate that some 8 million Americans have used the drug, and that 5½ million of them have been between 12 and 25 years of age. Unlike the decline in the use of LSD and other hallucinogens during the 1970s, the use of phencyclidine has increased. The reasons for this increase are unclear. No evidence exists that the drug produces physical or psychological dependence. The number of youths and young adults taking the drug doubled between 1976 and 1977. From 1977 to 1979 there was no marked increase in use in these groups, although paradoxically, use of the drug by older adults (over 25 years of age) doubled during this time. The most recent surveys indicate that by 1980 almost 2 million of the 124 million Americans over the age of 25 had used phencyclidine. In 1979 one of every eight high-school seniors, or 7.0 per cent of the graduating class, used the drug, and this figure dropped to 3.2 per cent for the class of 1981.⁶ Studies of patterns of use have indicated that 81 per cent of users were white, 65 per cent were men, 88 per cent were between 10 and 29 years old, and 72 per cent purchased the drug on the street, where it is commonly misrepresented as tetrahydrocannabinol, the principal active ingredient in marijuana. An unusually high percentage of phencyclidine users consumed other illicit drugs as well.^{13,16-23}

COCAINE

Cocaine is a naturally occurring central-nervous-system stimulant extracted from the leaves of the coca plant. Though it does not produce true physical dependence with definite withdrawal symptoms, after continual exposure cocaine creates a psychological dependence with an excessively strong craving (and sometimes depression as an indirect effect), particularly in users who administer it intravenously. This can lead to a strong compulsion to obtain the drug, with concomitant prolonged disruption in normal behavior and adverse social consequences. Thus, cocaine produces an addictive syndrome. Users have also experienced anxiety; paranoia; and hallucinations of touch, taste, and smell. Because of its relatively high cost, cocaine is used sporadically and only in small quantities. It is sold as a white, translucent, crystalline powder and is usually adulterated to about half strength with talcum powder or dry milk. Users take cocaine intranasally, and some frequent users may inject it. The drug produces a constriction of the peripheral blood vessels; a rise in body temperature and metabolic rate; dilated pupils; increased heart rate and blood pressure; and an immediate feeling of euphoria, confidence, and energy.²⁴ Cocaine appears to be especially popular in certain professional and artistic circles and, most recently, among professional athletes.

A study of trends indicates that cocaine is second only to marijuana in its popularity during the past decade. Approximately 10 million Americans have used the drug. The rate of increase since 1972 in all age groups has actually been higher than the rate for marijuana. The largest increase during this time has

been in the 18-to-25 age group. By 1980, 27.5 per cent of the 32 million Americans in this group (approximately 9 million) had used cocaine; two years earlier, this figure was only about 19.1 per cent, or approximately 6 million — reflecting the accelerated increase in popularity.¹¹ These lifetime prevalence figures indicate the number of people who have used the drug but not the number who continue to use it. Lifetime-frequency studies show that one fourth of adult users have used the drug once or twice, one third have used the drug 3 to 10 times, and one third have taken cocaine 11 to 99 times. The most recent findings indicate that about 16 per cent of the high-school class of 1981 have tried cocaine — approximately one of every six. Cocaine use is considerably greater in the large cities and in the western part of the nation.^{6,23,24}

HEROIN

The number of Americans who use heroin is much smaller than the number using any of the other drugs discussed in this article. However, because heroin is a highly addicting drug and because of its relation to crime, its use continues to be a problem in the United States. A narcotic white crystalline powder derived from morphine, heroin acts to relieve pain and to produce an intense state of euphoria. It also produces an extremely powerful physical dependency in many, though not all, who use it. Most studies indicate that users who have become addicted experimented with the drug approximately 5 to 18 months before dependency developed. Usually administered intravenously, heroin is short-acting and must be taken every few hours to avoid withdrawal symptoms. Beginning 12 to 16 hours after the last injection, these symptoms include shaking, sweating, vomiting, muscle aches, chills, abdominal pain, and diarrhea. As withdrawal progresses, other symptoms occur: weakness, chills alternating with flushing and sweating, increased heart rate, pain in the back and extremities, and muscle spasms that result in characteristic kicking (perhaps the source of the expression "kicking the habit"). Without treatment, the symptoms gradually disappear within 7 to 10 days.

Controversy exists over the nature of the relation between heroin addiction and crime. (There appears to be a strong relation to theft, prostitution, and forgery but a considerably weaker relation to violent crime.) Some authorities believe that a criminal's character structure makes him or her particularly vulnerable to addiction. Others attribute the relation between heroin and crime to the black market that exists because of the illegal status of the drug. The resultant high prices, they believe, force the addicts into criminal behavior to support their addiction. Because stringent laws and severe penalties prohibit the manufacture and importation of heroin, nationwide surveys have proved inadequate in determining the extent of its use in the United States. Estimates based on such indicators as the size of the treated population suggest that almost half a million Americans are addicted to heroin. This figure for the general population has var-

ied little from year to year. Lifetime-prevalence rates among high-school seniors declined gradually between 1975 and 1979, and leveled off in 1980 and 1981. In the class of 1981 1.1 per cent reported having used heroin — approximately the same percentage as in the graduating classes of the previous two years.^{10,12,23}

PSYCHOTHERAPEUTICS

Millions of Americans use tranquilizers, sedatives, and stimulants without medical supervision. In contrast to the substances discussed above, these drugs are prescribed by physicians for therapeutic purposes. The nonmedical use of sedatives and stimulants is greater than that of tranquilizers.

Within the general class of sedatives, the barbiturates and methaqualone (Quaalude) top the list of psychotherapeutic drugs used without medical supervision. Physicians prescribe barbiturates, which contain the powerful central-nervous-system depressant barbituric acid, for anxiety, tension, and insomnia. Barbiturates are highly addictive. In large doses they may produce a state similar to the "high" produced by alcohol, or a fluctuating mood, irritability, and despondency. Barbiturates are frequently used without medical supervision in an attempt to counteract the adverse effects of stimulants, hallucinogens, or withdrawal from heroin. Barbiturates are the most commonly used drugs in suicide by overdose.

Methaqualone, a rapidly acting sedative, has become popular among certain age groups, perhaps because of its purported aphrodisiac effects. An estimated 9 million Americans have used sedatives without medical supervision, approximately 5½ million of whom are 18 to 25 years of age. This figure has remained essentially unchanged over the past few years. Trends in sedative use among high-school seniors showed a gradual decline in use during the late 1970s, followed by a reversal in this decline in the classes of 1980 and 1981. Lifetime prevalence dropped from 18 per cent in the class of 1975 to 14.6 per cent in the class of 1979 and then increased to 16 per cent in the class of 1981. However, use of the specific sedative methaqualone by high-school seniors rose sharply from 1976 to 1981. This increase may be related to the recent dramatic increase in cocaine use, since methaqualone is frequently used to bring the cocaine user "down."^{6,10,11} Though methaqualone is currently a controlled substance, illicit tablets produced by clandestine or small foreign laboratories supply most users.

Amphetamines act as a strong central-nervous-system stimulant and are similar in effect to the longer acting versions of cocaine. First introduced in the 1930s as appetite suppressants, they produce a sense of exhilaration, a surge of energy, and a state of extended wakefulness. Because they induce both physical and mental alertness, amphetamines became popular among college students who wanted to stay awake while studying and among athletes who wanted to reduce fatigue. As part of the early drug culture in the 1960s, amphetamine abusers would inject as much as

100 times the average prescribed dose. Intravenous injection produced a sudden sensation known as a "rush." A period of depression called "crashing" followed protracted use.

Long-term use of amphetamines leads to psychological dependence and to tolerance. Low or moderate doses may induce irritability and apprehension. Frequent large doses may produce brain damage, speech disturbances, mental aberrations, repetitive grinding of the teeth, repetitive touching or picking of the face and extremities, suspiciousness, and a sense of being watched. Continual high doses may result in an amphetamine psychosis, involving auditory and visual hallucinations, paranoia, and bizarre violent behavior. Sudden withdrawal often results in a prolonged, profound depression. Fatalities have been reported among athletes taking moderate doses of amphetamines under conditions of extreme exertion. As the harmful effects of amphetamines have become known, physicians have limited their use to narcolepsy, hyperkinetic behavioral disorders in children, and selected cases of obesity.

An estimated 13 million Americans have used amphetamines without medical supervision. In the general population about one of five young adults has reported using stimulants for nonmedical reasons. Prevalence rates in all age groups did not change markedly in the later part of the 1970s but have increased noticeably during the past two years. This same trend holds true for high-school seniors. In the graduating classes of 1979, 1980, and 1981 there has been a progressive increase in the use of stimulants, with one third of the class of 1981 reporting having used amphetamines without medical supervision.^{6,10-12,23,25} However, these prevalence rates may be exaggerated because of the increase during the past two years of over-the-counter stimulants and mail-order pseudoamphetamines that look like and have names that sound like real amphetamines. These readily available pills contain caffeine or the mild stimulant phenylpropanolamine. Many of the people who take them may think they are taking real amphetamines and report them as such in a survey.

Though not a part of the illicit drug use that began in the early 1960s, other drugs, such as the minor tranquilizers and sleeping pills, are widely used psychoactive substances. The abuse of these drugs often results from intentional or inadvertent misprescription by physicians. In addition, because of their widespread use, alcohol and tobacco must also be mentioned. In the high-school class of 1981, 56 per cent of the students reported that they had begun using alcohol before entering high school, and 6 per cent, or over a quarter of a million, ingested it daily.⁶ In this same class 56 per cent had begun smoking cigarettes before entering high school, and 13.5 per cent smoked half a pack or more a day.⁶

MARIJUANA

Marijuana (from the plant *Cannabis sativa*) is the most widely used illicit drug in the nation and contin-

ues to be a major public concern. The cannabis plant has been grown for centuries as a psychoactive substance and as a source of hemp fiber. Of the hundreds of chemicals contained in the plant, delta-9-tetrahydrocannabinol, the main psychoactive ingredient, was identified and synthesized in 1964. The potency of street samples has increased fivefold since 1978.⁵ Moderate doses of marijuana have an acute effect on the brain, including neurochemical and electrophysiologic changes. About half of those who try the drug on an experimental basis continue to use it. Ninety per cent of those who used the drug daily in high school continued to use it four years after graduation, half of them on a daily basis.^{5,6} Because of the increasingly large numbers of regular users in all age groups and because of a growing body of scientific evidence indicating the adverse effects of marijuana, researchers have underscored the need for more information, especially on the long-range effects of the drug. Clinical reports suggest that long-term use of marijuana may produce psychological dependence. Laboratory evidence indicates that tolerance and physical dependence can occur,¹⁸ but whether these phenomena are important factors in the typical use of marijuana remains unclear. The most recent comprehensive report on marijuana concluded that although many important questions concerning the extent of the risk remain unanswered, we have sufficient knowledge to justify "serious national concern."³

The effects of marijuana on physical health have been reviewed extensively elsewhere^{2,3,5,17} and will be mentioned here only briefly. The drug produces acute changes in the cardiovascular system that are similar to the effects of stress. By raising heart rate and blood pressure, marijuana increases the workload of the heart and is therefore particularly dangerous in people with coronary atherosclerosis, cerebrovascular disease, or hypertension. Evidence continues to accumulate suggesting that long-term use impairs lung function. Cancer-producing hydrocarbons, such as benzopyrene, have been reported to be 70 per cent more abundant in marijuana smoke than in tobacco smoke.²⁶ Bronchodilation may occur as a short-term effect in the marijuana smoker, with asthmalike symptoms, laryngitis, pharyngitis, bronchitis, cough, and hoarseness occurring after long-term use. Impaired pulmonary function was demonstrated in the laboratory within six to eight weeks after subjects had smoked a few marijuana cigarettes a day. Contaminants, such as bacteria and herbicide paraquat, increase the dangers that marijuana poses to the respiratory system. Recent evidence suggests that some samples of marijuana contain pathogenic, inhalable aspergillus and may cause invasive pulmonary and allergic aspergillosis, especially when used as an antiemetic in immunodeficient patients with cancer who receive chemotherapy. Evidence that suggests the adverse effects of marijuana on the immune and reproductive systems and on chromosome segregation has evoked concern, but the clinical importance of these observations remains to be established.^{17,27-31}

The most notable and consistent recent data pertain to the short-term adverse effects of marijuana on intellectual and psychomotor functioning. Earlier findings showed that marijuana intoxication impaired intellectual performance in several areas, including the ability to repeat in forward and backward order a succession of digits,³² to make a succession of repeated subtractions mentally,³³ to form concepts,³⁴ to read with comprehension,³⁵ to speak coherently,³⁶ and to transfer material from immediate to longer term memory storage.³⁷ More recent studies show that the short-term adverse effect on memory and cognition varies with the dose of the drug, the level of motivation, and the specific intellectual task.³⁸ A single moderate dose can impair short-term memory, especially that involved in the acquisition and storage of information.^{32,39-41} Because an increasing number of young students smoke marijuana during school hours, learning and academic performance may be affected. Marijuana also impairs the sense of time, causing the user to overestimate consistently the amount of time that has elapsed since a particular event.⁴² Impairment of learning, memory, and time sense contributes to difficulty in oral communication. Moderate doses of marijuana may interfere with clarity of speech; a discontinuity in thought sequence and a greater lag time than normal between the cue to talk and the actual onset of talking may occur, resulting in communication of irrelevant words and ideas.^{41,43} Low doses of marijuana also impair sensory and perceptual functions,^{44,45} as well as tracking performance (the ability to follow a moving stimulus).^{40,46} Reaction time shows minimal and inconsistent impairment.⁴⁷ At the levels typically used socially, marijuana also impairs motor coordination — hand steadiness, accuracy of execution movements, and postural stability.^{48,49}

The impairment of coordination, of sensory and perceptual functions, and of tracking affects a person's ability to operate machinery, drive a car, or fly a plane. Several recent studies show that even moderate doses of marijuana may seriously impair not only driving and flying ability,⁵⁰⁻⁵² but also concentration and judgment.⁵³ Other studies confirm that this impairment may persist four to eight hours after the user has had subjective feelings of being "high."^{46,54} Preliminary evidence suggesting that marijuana contributes to the high incidence of automobile accidents among the young comes from studies of highway accidents and fatalities and from surveys showing that marijuana users have more than the average number of automobile accidents.⁵⁵⁻⁵⁷ These findings are particularly important in the light of recent evidence that marijuana is being used at an earlier and earlier age; that those who use alcohol early also tend to use marijuana early; and that the combination of marijuana and alcohol produces greater impairment of reasoning, judgment, manual dexterity, and psychomotor coordination than does either drug alone.^{58,59}

An important body of clinical data establishes a clear, though not necessarily causal, relation between marijuana use and certain clinical syndromes. A high

proportion of users report serious short-term adverse effects from marijuana: fearfulness, confusion, excessive dependency, intense aggressive impulses, panic, paranoid reactions, hallucinations, and distortions of body image.⁶⁰⁻⁶² These negative reactions occur more frequently in first-time users than in regular users. Researchers have reproduced these effects in the laboratory.⁶³ Physicians using marijuana to treat patients with cancer for the nausea and vomiting associated with chemotherapy have reported that marijuana caused severe dysphoric reactions, such as disorientation, catatonia-like immobility, panic, and heavy sedation.⁶⁴

Because widespread regular use of marijuana is a relatively recent phenomenon, the consequences of long-term use are less clearly documented than the short-term effects. Of serious concern to physicians is the number of case reports of patients who have recovered from mental illness only to have a relapse after using marijuana. These uncontrolled clinical reports indicate that in patients with preexisting schizophrenia, hypomania, or depression a relapse or an exacerbation of symptoms may follow the use of marijuana.⁶⁵⁻⁶⁷ Physicians have also observed a constellation of symptoms in daily users that is known as the "amotivational syndrome": apathy, loss of ambition, difficulty in concentrating, deterioration in school or work performance, intermittent confusion, and impaired memory^{68,69}; but how much of this clinical picture is directly due to marijuana use remains uncertain.

In 1962, during the formative stages of the drug culture, marijuana was used exclusively in the 18-to-25 age group. Approximately 4 of every 100 people in that group had used the drug.¹⁰ According to surveys completed in January 1980, 68 of every 100 people in the same age group had used marijuana — or approximately 21 million Americans. About 40 per cent of these people had used it a minimum of 100 times. More than 50 million persons from all age groups have had some experience with marijuana. Unlike users in the early 1960s, most of whom were college students attending universities in large coastal cities, users today represent all age groups, all geographic regions, and all socioeconomic classes.^{3,5,6,11}

The most recent survey of high-school seniors also reflects the dramatic increase in the use of marijuana during the past two decades: 59.5 per cent of the class of 1981 reported having used the drug. As staggering as this figure may be, the federal agencies that sponsor the national drug surveys and the university research institutes that conduct them insist that because certain populations have been omitted from the surveys (for example, high-school dropouts, among whom the prevalence of drug use is even higher), the reported prevalence rates are extremely conservative.¹² In 1978, 11 per cent of high-school seniors, or nearly half a million of them, used marijuana daily; the figure had almost doubled during the prior three years. Since 1978 daily use among high-school seniors has gradual-

ly tapered off, and it dropped to 7 per cent in the class of 1981.⁶

A strong statistical association exists between the use of marijuana and the use of more serious drugs.^{10,19} A person who smokes marijuana is more likely than a nonuser to become involved in other illicit drugs. Although the prevalence of marijuana use and the number of high-school seniors using marijuana daily has tapered off since 1979, the number of marijuana users who have gone on to use other illicit drugs has actually increased.¹¹ In this population of users marijuana is usually the third stage in a predictable sequence of drug use, regardless of the age of initiation. In the first stage beer and wine are used, in the second stage tobacco cigarettes or hard liquor, in the third stage marijuana, and in the fourth stage more serious drugs.⁷⁰ Although no evidence exists for a causal relation between stages, and one stage does not inevitably lead to the next, the majority of marijuana users have had previous experience with both hard liquor and tobacco, and the use of these two substances usually precedes the use of all illicit drugs. This finding may have important implications for drug-prevention measures, since studies show that adolescents who drink have learned their drinking habits from their parents.^{10,20,21,26,27}

Marijuana is being used by younger and younger age groups.^{5,6,17} This finding also has serious implications, not the least of which is that the earlier the age at which marijuana is first used, the greater the likelihood of involvement with more serious drugs.^{6,22} The age of first use has declined progressively over the past 15 years. In the early stages of the drug culture the first use of marijuana occurred primarily after high school. In 1981, however, 34 per cent of high-school seniors had begun smoking marijuana before entering high school, and many had started to use it as early as the sixth grade.

PSYCHOSOCIAL ANTECEDENTS OF DRUG USE

People who use illicit drugs differ markedly from nonusers. Large-scale studies with a high degree of reliability have shown that there are important differences in attitudes and values, in personality traits, in home and school environment, in relations with parents and friends, and in overall behavior. The patterns of disaffection and rebellion that characterized users in the counterculture of the 1960s continue to characterize those who use drugs today. Drug users in the 1980s embrace a constellation of attitudes and values that reflect an openness to deviant behavior and non-conformity with respect to social institutions. Regular marijuana users, for example, tend to place a lower value on academic achievement and a higher value on independence, as compared with nonusers. Those who use marijuana regularly also have less motivation; perform more poorly in school; have fewer religious convictions; and are more involved in antisocial and delinquent behavior, such as stealing, brawling, vandalism, and truancy. As a group they possess person-

ality traits indicative of maladjustment, including rebelliousness, depressed mood, and low self-esteem. Those who use drugs even as young teen-agers tend to have friends who are markedly incompatible with their parents, and tend to be more influenced by these friends than by their parents.⁷¹⁻⁷⁵

Recent data from several well-designed longitudinal studies provide clear documentation that most of these correlates of drug use actually precede and predict the use of drugs.⁷²⁻⁷⁶ Some predictive factors, such as rebelliousness and aggressiveness, can be identified in childhood long before drug use begins.⁷⁶ Furthermore, certain predictive factors appear to be more strongly related to some drugs than to others. Depression, for example, has a weak association with initiation of marijuana use but is an important predictor of subsequent involvement with more serious drugs. Parental attitudes and behavior also have different predictive importance. If parents smoke, drink, or use psychoactive drugs, such as stimulants, tranquilizers, or barbiturates, their adolescent offspring will generally be more prone to use illicit drugs. Parental use of hard liquor alone is not an important predictor of marijuana use, but it is an important predictor of use of hard liquor and other illicit drugs. One of the most consistent findings of drug research concerns the drug behavior and drug-related attitude of peers. Although no causal relation has been established, people with friends who use drugs or with friends who have a favorable attitude toward the use of drugs have a considerably higher probability of becoming involved with drugs themselves. Two processes appear to account for this relation: the influence of one friend on another, and the tendency to seek out as friends those who share one's values and interests. Susceptibility to the influence of friends relates to several characteristics of drug users: lack of a close relation with parents, a large amount of time spent away from home, and increased reliance on peers as opposed to parents.⁷⁷⁻⁷⁹

Recent data show a strong association between drug use and proneness to deviant behavior. Those who use marijuana exclusively have been reported to engage in more deviant behavior than nonusers but in less deviant behavior than those who use several other illicit drugs.^{19,21}

Although the majority of the psychosocial and behavioral correlates of marijuana use precede and predict use of the drug, some follow-up studies show not only that stealing, property destruction, truancy, and poor academic performance precede the use of marijuana but that such behavior is exacerbated after involvement with the drug.^{74,80}

DISCUSSION

A review of an extensive body of research reveals that an explosive increase of about 20-fold in the use of all illicit drugs occurred during the 1960s and 1970s. Use of marijuana increased 30-fold during this period; today approximately one quarter of the entire population have smoked it, and 20 million people use it daily.

One overriding and disturbing question emerges from these findings: What motivates such a vast segment of our society to inhale, ingest, or inject into their bodies this wide assortment of mind-altering substances? When asked this question, those who reported using marijuana daily said that they did so primarily to alter how they felt — to help cope with feelings of stress, anger, depression, frustration, or boredom.¹⁹ College students who used LSD said they took the drug to reduce feelings of loneliness and isolation, to enhance creativity and productiveness, to increase social and sexual effectiveness, and to fill a "moral and spiritual void."⁹ In essence, people take these drugs to alter or to escape from a less than tolerable reality, and to meet intense emotional needs.

These answers, however, only raise more questions. Can we attribute this enormous increase in drug use to changing emotional needs in our society or merely to the resources now available that promise to meet these needs? Above all, what can be done to stem this epidemic? Must we wait until we have more data from basic and general research on epidemiology, consequences, and treatment, or until we have discussed more thoroughly such issues as preventive education and decriminalization? Do these approaches tend to focus primarily on the symptoms of the epidemic rather than on root causes?

Because human behavior is complex and multidetermined, we risk using the inevitable need for further research as a means of avoiding thinking through the problem at hand. Perhaps we need not only more information but more understanding of the information we already possess. We need to understand this information, for example, in the light of the considerable knowledge of human development that has been accumulated over the past half century. Recent findings indicate that drug users — a small percentage of our population 15 years ago and now a large segment of it — differ markedly from the rest of the population. We need to explore the origins and dynamics of the specific character traits and psychological needs of the drug-using population in reference to changing child-rearing practices in the United States.

Research over the past four decades has stressed the importance to the developing child of the physical presence and emotional accessibility of both parents.^{81,82} In addition, a vast body of research has shown that the absence of a parent through death, divorce, or a time-demanding job contributes to many forms of emotional disorder, especially the anger, rebelliousness, low self-esteem, depression, and anti-social behavior that characterize drug users.⁸³⁻⁸⁹ Changes in child-rearing practices and family stability in the United States, beginning several years before the drug culture evolved, have shifted child care from parents to other agencies.⁹⁰ Cross-cultural studies indicate that American parents spend less time with their children than parents in any other nation in the world except England.^{91,92} The accelerating divorce rate in the United States has closely paralleled the rise

in drug use, and over half the children under the age of 18 (approximately 13 million) live in a home with one or both parents missing.⁹³ Moreover, poor academic performance, susceptibility to peer influence, and delinquent behavior (all characteristic of drug users), as well as suicide and homicide, have been found to be more pronounced among children from homes with one or both parents missing or frequently absent.^{94,95}

The suggestion of a relation between these trends and drug use may at first appear speculative and highly improbable. Yet the wide agreement that character traits and psychological needs are determined not only by genes but by family environment, and the important body of research⁹⁵ indicating that the family environment that is increasingly prevalent today contributes to the very traits characteristic of drug users warrant attention. Exploration of possible relations among these trends may prove helpful in ascertaining the causes of this epidemic in drug use, and perhaps eventually in determining the most effective measures for stemming it.

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