Drug Policy: Striking the Right Balance

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Drug policy should strike the right balance between reducing the harm done by psychoactive drugs and reducing the harm that results from strict legal prohibitions and their enforcement. It is concluded, from a cost-benefit analysis based on pharmacologic, toxicologic, sociologic, and historical facts, that radical steps to repeal the prohibitions on presently illicit drugs would be likely, on balance, to make matters worse rather than better. Specific recommendations are offered for ameliorating the dangers to users and to society that are posed by each addictive drug.

PSYCHOACTIVE DRUGS OBVIOUSLY PROVIDE PLEASURE OR relief to millions of users, but also can do enormous individual and social harm. The recurring debate about legalizing illicit drugs arises from different perceptions of the degree of harm caused by their prohibition, relative to the harm caused by the drugs themselves (*1*). At one extreme are libertarians who advocate removal of criminal sanctions from all drugs. At the other extreme are governments that apply the death penalty for even minor levels of trafficking. The status quo in most of the world consists of different degrees of regulation for different psychoactive drugs, only caffeine being available without restriction. Accordingly, the debate is not about the oversimplified dichotomy, legalization versus prohibition, but rather about the specifics of regulatory policies for each drug.

An ideal policy for each drug would strike the best balance among all the costs and benefits (*2*). The right to enjoy the pleasurable effects of drugs and freedom from state interference in citizens' private lives must be weighed against the benefits of governmental measures to protect the well-being of drug users, people around them, and society at large. The harm produced by excessive drug use must be weighed against the costs, both monetary and social, of enforcing whatever degree of regulation is imposed. Every cost-benefit analysis carries an implicit bias, which reflects the ethical, social, religious, and political views of those doing the analysis. Our bias is toward a humane and democratic society that provides maximum individual freedom, but the exercise of such freedom must be consistent with the rights of others and the harmonious functioning of the community. All laws have potentially harmful effects, but policy recommendations based only on considering harm caused by the law would be just as unbalanced as those based only on considering harm caused by the drugs themselves.

All drugs can be dangerous; even when they are pure and are used on prescription to treat disease, they often have adverse effects. Most governments are required, by public consensus and demand, to protect citizens against numerous avoidable hazards and not merely to warn them of possible dangers. The U.S. Pure Food and Drug Laws, enacted in 1906, set up the technical machinery, the Food and Drug Administration (FDA), for assessing drug hazards, forbidding over-the-counter sale of the more dangerous drugs, requiring manufacturers to report on unanticipated adverse reactions, and exercising legal control over drug distribution. This legislation grew out of the recognition that innocent people, without the technical expertise needed to assess the risks, were being hurt by drugs with unacceptably high risk-to-benefit ratios (*3*).

The use of drugs for nonmedical purposes carries risks not only for the user, but for society as well. A compassionate society ultimately pays the costs, not only of injury to nonusers, but even of self-inflicted injuries to users themselves. Society pays the costs of all acute and chronic toxicity through loss of productivity and by subsidizing medical care, providing welfare assistance to users' families and dealing with the special educational needs of children whose brains were damaged in utero (*4, 5*). Thus, drug abuse is rarely a victimless crime. We think that society has a right to take the costs into account in formulating its drug policies.

We shall argue here that (i) psychoactive drugs are, to varying degrees, dangerous to users and to society, (ii) drug consumption is strongly influenced by availability, (iii) availability can be modified, not only by outright prohibition, but in many ways short of prohibition, (iv) although supply reduction is a desirable goal, demand reduction is the real key to lasting amelioration of the drug problem, and (v) rational drug policy ought to be tailored to the dangers presented by each psychoactive drug to users and to society.

Psychoactive Drugs Are Dangerous

Legalizing and regulating drugs that are now illicit would, through quality control measures, eliminate harmful effects due to unknown and variable potencies, adulterants (such as particulates responsible for embolism after intravenous injection), toxic byproducts of illicit manufacture, and bacterial or viral contamination. All other adverse effects, however, are due to intrinsic properties of each drug (Table 1) and thus are independent of legal status. Harm to the user may occur immediately or only after chronic use and may be due to behavioral effects of the drug or to toxic actions on organ systems (*6–8*).

An example of a significant threat to both the user and society is the paranoid psychosis, sometimes accompanied by violence, that

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can result from repeated use of amphetamines or cocaine (*9*). In classic experiments (for example, *10*) administration of amphetamine or cocaine to normal human volunteers on a regular dosage schedule produced paranoid psychotic behavior. Such studies showed that no previous psychopathology was required and that paranoid reactions to drugs of this class by addicts cannot be attributed to fear of law enforcement but are due to direct drug effects on the brain. Another example is the possibility of lasting brain damage from alcohol, volatile solvents, cocaine, phencyclidine (PCP), marijuana, and 3,4-methylenedioxy-methamphetamine (MDMA, which is also known as ecstasy) (*11*).

The addicting drugs have two special characteristics with policy implications. First, repeated long-term administration produces a state of physical dependence (*12*), so that neurochemical brain function is disturbed (withdrawal syndrome) if the drug is suddenly discontinued. This dependence occurs in animals as well as in humans. The pattern of dependence and the intensity of the withdrawal syndrome differ among drugs and among users. Dependence accounts, in part, for the compulsion to continue use of an addicting drug, and it complicates the treatment of addicts. However, there are effective medical procedures for ameliorating withdrawal distress during detoxification (*6, 13, 14*).

The second special characteristic, tolerance (*12*), which is typically associated with the development of physical dependence, is manifested by a tendency to escalate dosage because the same dose is no longer as effective as it was before. As with physical dependence, the degree of tolerance differs among drugs and among users. An extreme form of dosage escalation is seen with heroin and cocaine under both experimental and real-life conditions (*15*). Dosage escalation complicates schemes for providing addicts with their favorite drugs free or at low prices; when this was tried in the British clinics for heroin addicts, the black market was resorted to for supplemental supplies when the dosage ceiling (high though it was) had been reached (*16*).

Many people are able to use addictive drugs in moderation. There are coffee drinkers who take only a cup or two a day, occasional smokers who use only a few cigarettes a day, social drinkers who consume no more than a couple of drinks a day, and marijuana users who smoke a "joint" once in a while. Some people (at least for some period of time) can restrict their use of heroin to weekends, or of cocaine to an occasional party (*17*). Others, in contrast, are vulnerable to becoming compulsive heavy users, then stopping only with great difficulty if at all, and relapsing readily. There is no sharp separation between so-called social users and addicted users, but rather a continuum of increasing levels of use and increasing levels of risk (*18*).

The compulsive quality of drug addiction presents a special danger because for most drugs there is no way to predict who is at greatest risk (*19*). People who become addicted usually believe, at the outset, that they will be able to maintain control. After the compulsion takes control, addicts persist in using high doses, often by dangerous routes of administration. As the heavy users constitute the heart of the drug problem, there is an urgent need for more research to explain why they doggedly persist in a self-destructive activity despite full knowledge of its consequences.

A part of the explanation is in the pharmacology of the drugs

Table 1. Toxic effects and addiction risk of the major psychoactive drugs. Listed here are effects due to the drugs themselves. The effects are dose-related and subject to individual variation in sensitivity, so not all are expected to be seen in every user. Approximate rankings for relative risk of addiction are on a 5-point scale, where 1 is most severe.

Drug category	Acute toxicity	Chronic toxicity	Relative risk of addiction
Alcohol and related drugs (benzodiazepines, barbiturates)	Psychomotor impairment, impaired thinking and judgment, reckless or violent behavior. Lowering of body temperature, respiratory depression.	Hypertension, stroke, hepatitis, cirrhosis, gastritis, pancreatitis.* Organic brain damage, cognitive deficits. Fetal alcohol syndrome.* Withdrawal effects: shakes, seizures, delirium tremens.	3
Cocaine, amphetamines	Sympathetic overactivity: hypertension, cardiac arrhythmias, hyperthermia. Acute toxic psychosis: delusions, hallucinations, paranoia, violence. Anorexia.	Paresthesias. Stereotypy. Seizures, withdrawal depression. Chronic rhinitis, perforation of nasal septum.	1
Caffeine	Cardiac arrhythmias. Insomnia, restlessness, excitement. Muscle tension, jitteriness. Gastric discomfort.	Hypertension. Anxiety, depression. Withdrawal headaches.	5
Cannabis (marijuana, hashish)	Psychomotor impairment. Synergism with alcohol and sedatives.	Apathy and mental slowing, impaired memory and learning (brain damage?). Impaired immune response?†	4
Nicotine	Nausea, tremor, tachycardia. High doses: hypertension, bradycardia, diarrhea, muscle twitching, respiratory paralysis.	Coronary, cerebral and peripheral vascular disease, gangrene. Gastric acidity, peptic ulcer. Withdrawal irritability, impaired attention and concentration. Retarded fetal growth, spontaneous abortion.†	2
Opiates	Sedation, analgesia, emotional blunting, dream state. Nausea, vomiting, spasm of ureter and bile duct. Respiratory depression, coma, synergism with alcohol and sedatives. Impaired thermoregulation. Suppression of sex hormones.	Disorders of hypothalamic and pituitary hormone secretion. Constipation. Withdrawal cramps, diarrhea, vomiting, gooseflesh, lacrimation, and rhinorrhea.	2
Hallucinogens (LSD, PCP)	Sympathetic overactivity. Visual and auditory illusions, hallucinations, depersonalization. PCP only: muscle rigidity, hyperpyrexia, ataxia, agitation, violence, stereotypy, convulsions.	Flashbacks. Depression, prolonged psychotic episodes.	5

*These effects result only from alcohol, not benzodiazepines or barbiturates. †Bronchitis, emphysema, precancerous changes, lung cancer, pulmonary hypertension, and cardiovascular damage by carbon monoxide are consequences of smoking tobacco or marijuana, not due to the respective psychoactive drugs. Inhalation of smoke by nonsmokers is also a significant hazard (*5*). With equivalent smoking, these chronic toxic effects occur sooner with marijuana than with tobacco.

themselves. Despite the acknowledged importance of peer group pressures, fads, personal and social stresses, price, and numerous other factors that affect drug use by humans, one cannot ignore the psychoactive drug actions, which are sought by the users. Experiments with rats, monkeys, and other species have shown that an animal fitted with an indwelling venous cannula, through which it can obtain an injection by pressing a lever, will establish a regular rhythm of lever-pressing if (and only if) the injection contains one of the known addicting drugs (*20*). One measure of the addictiveness of a drug is how hard the animal will work (that is, how many lever-presses it will make) for each injection. Another measure is the extent to which the animal engages in drug self-administration to the exclusion of normal activities such as eating, drinking, exploratory behavior, grooming, or sex. Yet another measure is the rapidity of relapse after a period of enforced abstinence. By these criteria cocaine is the most addictive drug known. Monkeys with unrestricted access in this laboratory procedure will actually kill themselves with cocaine by cardiovascular collapse, starvation, dehydration, or skin infections due to self-mutilation (*21*).

Cognitive factors have a role in moderating the behavior of humans who try psychoactive drugs but do not become addicted. Nevertheless, single-minded preoccupation of many cocaine, heroin, nicotine, and alcohol addicts with obtaining and using their respective drugs is disturbingly reminiscent of the animal experiments and reflects a major role of direct drug effects in driving addictive behavior. Research has begun to reveal where the addicting drugs act in the brain to produce the rewarding effects that give rise to self-administration behavior (*22*). We are far from understanding fully how and where each psychoactive drug acts on these reward pathways, but the emerging picture suggests the following. Reward systems have developed over the course of evolution to reinforce useful behaviors and extinguish harmful ones and to maintain and adaptively regulate a fine-tuned set of drives related to pleasure and pain, emotional and sexual satisfaction, hunger, thirst, and satiety. Addicting drugs act on these same systems by substituting for the natural neurotransmitters that act at different points in the circuitry, thus producing an artificial state of reward (euphoria), a powerful compulsion to sustain that state, and possibly irreversible (or long persistent) dysfunctions of the reward mechanisms.

Availability Affects Consumption

As would be expected, the ease of obtaining a drug affects its consumption. Contrary to the prevalent view that prohibition failed, there is substantial evidence that it reduced alcohol consumption substantially, albeit at the price of bootlegging, gangsterism, violence, and disrespect for the law among some segments of society. De facto prohibition of alcohol was introduced in the United States around 1916 (*23*) and continued as a wartime restriction, at a time when the temperance movement (and then the war effort) enjoyed a wide public support. A prompt fall occurred in the death rate from liver cirrhosis, which is a good index of the prevalence of alcoholism in the population and which correlates well with the mean per capita consumption of alcohol. The decrease in cirrhosis deaths from about 12 per 100,000 in 1916 to less than 7 in 1920 corresponds to a 50% fall in alcohol use (*24, 25*).

Conversely, lowering of the legal drinking age in a number of states and provinces led to an immediate increase in alcohol-related driving accidents contributed by those under 21 (*26*). Thus, although drinking by those under 21 had, no doubt, gone on previously, it increased sharply when the law permitted it. The potential effectiveness of legal restraints is also indicated by the ending of the Japanese methamphetamine epidemic through stringent enforcement by the police, backed by an anti-drug consensus among the general population (*27*).

An example of how availability affects drug use is provided by the experience of physicians, dentists, and nurses, who have easy (though illegal) personal access to psychoactive drugs that are forbidden to the general public. Despite the risk of heavy sanctions, such as loss of professional license and possible criminal prosecution, the per capita prevalence of addiction to opiates and other drugs was found to be much higher than in a matched control population (*28, 29*).

Injudicious prescribing practices may allow diversion of a medically approved drug into the illicit market. In New York State, the simple step of imposing a triplicate prescription system for benzodiazepines, to permit accurate record keeping by the authorities, produced a dramatic drop in consumption (especially of Valium) and a steep increase in the street price of these widely abused drugs (*30*).

From the standpoint of the consumer, a rise in price is tantamount to decreased availability and vice versa. Thus, price affects drug use. The mean per capita consumption of alcohol in Ontario between 1928 and 1974 varied inversely with the unit price of alcohol in constant dollars, in almost perfect mirror-image fashion, and a similar relationship has been shown for several European countries. The cirrhosis death rate also varied inversely with price, indicating that alcoholics as well as social drinkers are affected by price changes. This price elasticity of alcohol use by alcoholics has even been demonstrated experimentally (Babor *et al.*, *31*). Similarly, smoking has varied inversely with the level of taxation on cigarettes. The sudden large increase in the use of cocaine in North American cities following the introduction of crack, a crude form of cocaine free base, has been attributed to the lower price of crack than of cocaine salt preparations, as well as to the easier and more effective method of administration by smoking. These data suggest that anything making drugs less expensive, such as legal sale at lower prices, would result in substantial increases in use and in the harmful consequences of heavy use (*31*).

Finally, education, fashion, and social consensus contribute to the shaping of public attitudes and practices with respect to drugs. Alcohol in western societies, cannabis in the Moslem world, and hallucinogens in Native American religions illustrate how socially accepted psychoactive drugs are incorporated into the traditions, values, and practices of a society (*32*). Social incorporation of a drug rests on a consensus with respect to the circumstances, amounts, and patterns of use that are considered acceptable. There is therefore an important difference between behaviors with respect to a long-acculturated drug and a newly introduced one, especially in a society undergoing rapid change (*33*). Illustrative are the current difficulties with cocaine in some American and Canadian cities in contrast to the stable or even declining use of longer established drugs in both countries (*34, 35*).

Policy Options: The Polar Extremes

The pharmacologic, toxicologic, social, and historical factors noted above provide a basis for predicting the consequences of various options for reducing drug availability. One option would be an even more Draconian enforcement of current drug prohibition laws. However, greater expenditure on measures of the kind now being used seems unlikely; political difficulties would arise if funds were diverted massively from other high-priority programs. Consequently, a more militant antidrug policy might well take the form of new measures that do not cost more but increase police powers by infringement of civil liberties, such as search without warrant,

prolonged detention for interrogation without formal charges, or further dramatic increases in the severity of penalties.

Stern measures have, indeed, been credited with ending major drug problems. It is claimed that the serious opium problem in China was ended by stern measures, including the death penalty, after the Communists came to power (*36*). The Japanese methamphetamine epidemic was stamped out by less brutal but nonetheless forceful measures (*27*). However, the cost, if democratic governments were to adopt similar measures, would be a significant change in the character of the society. In addition, the explicit constitutional guarantees of the U.S. Bill of Rights and Canadian Charter of Rights would pose formidable obstacles to such a drastic course.

The antithesis of this approach, the legalization of psychoactive drugs, has been proposed as a possible way to reduce the high costs of enforcing existing prohibitions. Not only would the police, courts, and prisons no longer have to deal with the huge load of drug cases with which they are now burdened, but also the legal sale of drugs of known purity at moderate prices would, it is argued, drive the illicit traffic out of existence. In addition, licit businesses and governments would allegedly earn huge revenues that now find their way into drug traffickers' bank accounts (*37*).

On the cost side, however, would be the consequences of increased use and abuse of the drugs themselves. Even the proponents of legalization acknowledge some risk of increased drug use with its attendant problems, but they argue that the extent of such increase would be small. However, as an editorial in *The New York Times* remarked, " . . . there is little evidence to support so stupendous a contradiction of common sense" (*38*); indeed, past experience suggests that the increase in use would be very large.

This common-sense expectation is generally confirmed by historical evidence. Alcohol and tobacco, which are now so freely available, are also the most widely abused drugs, but—as noted earlier—alcohol consumption was much lower when the drug was less readily available. Social custom made cigarettes effectively unavailable to women until after World War I; then consumption increased steadily as it became more acceptable for women to smoke, and the lung cancer rate for females eventually matched that for males. Opiates and cocaine were legal and freely available before passage of the Harrison Act in 1914 (*39*). Despite the absence of sound nationwide surveys, there is evidence to suggest that this availability had given rise to widespread and serious misuse. According to an epidemiologic study conducted in 1913 (*40*), the percentage of adults addicted to these drugs appears to have been not very different from the percentage addicted to alcohol in present-day North America.

The history of alcohol provides some basis for predicting what might be expected from the removal of all drug prohibitions (*41*). The key question is whether legalization of opiates and cocaine would result in levels of addiction comparable to those seen currently among the users of alcohol and tobacco. Opiates and cocaine are certainly not less addictive than alcohol or nicotine by any criterion. And although the intravenous route might never become widely popular, smoking (especially of crack) would be the route of choice for the millions. There is no reason to doubt that the increased costs to society would rival those now attributable to alcohol. In that case the economic savings that might be achieved, even if it were possible to eliminate all the costs of drug law enforcement, might well be offset by the additional costs resulting from the consequences of increased drug use.

If the government were to attempt to prevent large increases in consumption by raising the prices for drugs sold through licit outlets, as suggested by some proponents of legalization, prices of illicit drugs could then be competitive, and drug traffickers could continue in business. Government would be in the unhappy position of having to choose between raising prices to discourage excessive use, thus allowing the illicit traffic to continue, and lowering prices enough to drive out the illicit trade, thus increasing consumption (*42*).

It has been argued that legalizing and taxing drugs would provide financial resources for treatment of those who become addicted, but in Canada in 1984 the total social costs of alcohol were double the revenues generated from alcohol at all levels of government. In the United States in 1983 this ratio exceeded 10 to 1 (*43*).

A further inevitable consequence of legalization would be the impact on public attitudes toward psychoactive drugs. The recent decline in drug use among high school students in the United States and Canada (*34*) probably reflects a gradual acceptance of medical evidence that has been part of the justification for the continued illegal status of some drugs. Removal of the legal restrictions would risk conveying the message that drug use is not really as harmful as the students had come to believe and thus would weaken an important influence tending to keep consumption levels low.

The right balance, we believe, lies somewhere between these policy extremes. The specific recommendations offered in the next section embody a variety of intermediate options based on two goals: (i) to reduce the recruitment of new addicts by making it more difficult and more expensive to obtain psychoactive drugs and by strengthening an anti-drug consensus through education; and (ii) to ameliorate the circumstances of those already addicted by regarding them as victims of a life-threatening disease (as indeed they are) requiring compassionate treatment.

Current Extent of the Problem

The "War on Drugs" may be a useful metaphor, in the sense that war mobilizes social forces, sets priorities, marshals extraordinary resources, and embodies shared societal goals. But, as with so many medical and social dysfunctions, total victory is an illusory goal. Psychoactive drugs have always been with us and probably always will be. The practical aim of drug policy should be to minimize the extent of use, and thus to minimize the harm. How best to do this is often uncertain, so budgets established in drug legislation should routinely mandate sufficient funds for evaluation. And inasmuch as behavior change comes slowly, it is important, as the elements of an improved drug policy are put in place, to be patient and give them time to work; this may well prove the most difficult of our recommendations to implement.

The first step toward a more rational and more effective drug policy is for the media, the public, and governments to see the drug problem in correct perspective. The current degree of concern about illicit drug use, bordering on hysteria, is at variance with the actual data on the magnitude of the problem. As to how this distorted perception came about, one is reminded of Lincoln Steffens's description of how newspapers, in his day, created "crime waves" (*44*).

What is the magnitude of the problem? Regular sources of national U.S. data are the National Household Survey and the High School Seniors Survey (*34*), DAWN [the Drug Abuse Warning Network for emergency room drug mentions (*45*)], and surveys of military personnel (*46*). These are supplemented by ad hoc (*47*) and local epidemiologic studies. In Ontario, surveys of students in grades 7 through 13 and of the adult general population have been carried out biennially since 1972 (*43*). The most recent estimates [Table 2 (*48*)] show that our most serious problem drugs by far are alcohol and nicotine (tobacco), whether assessed by damage to users, harm to society, or numbers of addicts (*49*).

The data in Table 2 (*48–50*), which indicate use in the past month

Table 2. The magnitude of the drug problem. Data are numbers of users, in millions (*48*). The population base sampled for this survey consisted of 198 million people aged 12 and over, living in households. Tobacco use includes smokeless tobacco, cocaine use includes cocaine free base (crack). U, unknown.

Drug	Frequency of drug use	
	In the past month	Once or more weekly
Caffeine	178	178*
Alcohol	106	47†
Tobacco (nicotine)	57	57*†
smokeless‡	7.1	7.1*
Marijuana	12	6.0
Nonmedical use of any psychotherapeutic drug	3.4	U
Cocaine	2.9	0.9–2.2§
crack‡	0.5	0.3‖
Inhalants	1.2	U
Hallucinogens	0.8	U
Heroin	1.9¶	0.6‖

*These are our estimates, based on the fact that virtually all users of these two drugs, if they use monthly, also use at least weekly (and usually daily). See text for daily use of other drugs. †Including 12 to 17 million functionally impaired alcoholics who use daily (the precise number depends on one's definition); virtually all tobacco users smoke or chew more than once daily. ‡These values are included in the immediately preceding amounts. §The lower number, from the Household Survey (*48*) is acknowledged to be an underestimate, as it excludes those living outside households. The higher number (*50*), could be an overestimate, biased by the fact that it is based on urine tests of arrestees (including those arrested for cocaine use), not on direct or indirect evidence of use once or more weekly. ‖This estimate is for daily use. ¶This estimate is for people who have ever used heroin, not just in the last month.

or week, obviously overestimate the size of the hard core of addicts who use drugs several times daily. On the other hand, all data sources tend to underestimate drug use in populations of low socioeconomic status (for example, homeless and transients). However, it is a fact (though not sensationalized by the media) that drug use, overall, has been declining—in all sections of the population, all parts of North America, and for all psychoactive drugs whether licit or illicit (*34*). The exception to this encouraging trend has been the recent increase in the number of people who use crack daily. This number is still relatively small, but it is of concern because of the peculiarly seductive quality of this form of cocaine (*51*) and because of the concentration of sales and associated violence in the inner cities (*52*).

Recommendations

Concerning supply reduction and the appropriate degrees of regulation. Ideally, one would wish to match the degree of regulation and the effort expended in enforcement to the real dangers posed by each drug to the user and to society. This would respond effectively to the criticism that our present laws are hypocritical, in that dangerous addicting drugs like alcohol and nicotine are freely available and even advertised, whereas marijuana, which is less dangerous than cocaine or heroin (but by no means harmless), is under stringent legal controls (*53, 54*).

One way to use technical expertise instead of politics to formulate more rational policies would be to apply the model of the FDA, whose mission, with respect to therapeutic agents, is to match the degree of regulation to the actual danger each presents. Congress could delegate regulation of the nonmedical use of psychoactive drugs to the existing Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA) with its three component institutes, the National Institute on Drug Abuse (NIDA), the National Institute on Alcohol Abuse and Alcoholism (NIAAA), and the National Institute on Mental Health (NIMH), much as it has delegated the regulation of therapeutic agents to the FDA. Under such a system, law enforcement responsibilities would remain with the Department of Justice. If removing the drug problem from politics is not yet feasible, the legislature should at least be guided, on a routine ongoing basis, by the best factual information from nongovernmental experts on psychoactive self-administered drugs, representing such fields as pharmacology, toxicology, medicine, psychology, psychiatry, criminology, law enforcement, and education.

Whatever degree of regulation is deemed, on balance, to be desirable for each drug, enforcement is essential for credibility and as a concrete expression of social disapproval. Enforcement has the desirable consequence of raising the black-market price of illicit drugs and making such drugs more difficult to obtain. The present situation, in which drug bazaars operate in full view of the police (*55*), seems intolerable in a society that claims to be ruled by law. It is unclear in such cases whether the police are corrupt or only demoralized, but it is noteworthy that corruption cuts through all strata of our governmental and private sectors, as numerous recent scandals have revealed. Thus, dealing effectively with the drug problem has broad implications for the rule of law in a democratic society.

Enforcement should be directed primarily at the higher levels of the distribution chain, but grandiose attempts to achieve a total interdiction of drug entry from abroad are a relatively poor investment. Advances in pharmaceutical chemistry are such that highly potent psychoactive drugs of every kind can be synthesized readily in clandestine laboratories, so the illicit market would adjust quickly even to a complete sealing of our borders, were that possible. A modest level of highly visible interdiction activities should probably be continued, if only for their symbolic value. But a massive shift of available funds is called for, from supply reduction to demand reduction (prevention education, treatment, and research). The federal drug war budget would be more cost-effective if the presently proposed ratio of of supply reduction to demand reduction—71% to 29%—were reversed (*56*).

Enforcement will be most effective if coupled to community action, originating locally but supported by adequate governmental funding and other forms of assistance. Especially in some inner-city, ethnic minority communities, enforcement is presently weakened by a widespread perception that the police apparatus behaves as a hostile, alien, and often racist force invading the community (*57*).

We advise retaining, for the present—and enforcing—the legal prohibitions on the importation, manufacture, distribution, and sale of opiates, amphetamines, cocaine, marijuana, and dangerous hallucinogens like PCP. At the same time we suggest reducing the penalties for possession of small amounts of these drugs for personal use. Other differential enforcement options should be explored; without rewriting the laws, some laws could be enforced more strictly than others, according to the dangers of the particular drugs and the individual circumstances, as has been done for marijuana in some jurisdictions (*58*). Unfortunately, recent U.S. legislation (*59*) compels judges to inflict minimum 5-year sentences even for small-time users who sell or share small amounts of drugs. We believe that criminalizing drug use per se is not productive, and we recommend that humane and constructive sentencing options be restored in drug cases.

It is sometimes argued that as marijuana seems to be the least harmful of the psychoactive drugs (excepting only caffeine), it could be legalized safely. However, the scientific evidence is still insufficient as to the potential magnitude of long-term harm (*54*), whereas the acute disturbance of psychomotor behavior is clearly dangerous under certain circumstances. It is not possible to predict with confidence what the result would be of vast expansion of the user

pool, especially of heavy users. If prevention education achieves its goals, and public attitudes and other nonlegal controls over cannabis use become strong enough, it might eventually be possible to loosen the regulatory controls without risk of a major increase in use and the likely attendant problems. The experience of states like Oregon and Alaska, which have experimented with relaxing total prohibition, should be studied carefully with a view to understanding the effects on consumption. The much-vaunted Dutch system deserves study; however, it was not a sweeping drug legalization, but rather a specific reduction of penalties for use of cannabis, while penalties on trafficking in other drugs were made more severe (*58, 60*).

We advise increased taxation on tobacco and alcohol—as is already being done in some jurisdictions—inasmuch as this is known to be an effective means of discouraging consumption (*31*). However, the resulting price increases must not be so great as to make an illicit market profitable. Uniformity of taxation across the country will be essential to avoid providing an incentive for interstate smuggling (*42*). One problem is preventing tax revenues from becoming incentives for government agencies to promote increased consumption. In the government monopoly retail sales model (another means of discouraging consumption), sales revenues themselves have this potential. Therefore, tax revenues (or sales profits) should go only to drug-related research, education, and treatment, not into the general treasury.

The degree of regulation on tobacco should be increased. Social pressures are reducing consumption, especially in the adult middle-class population, but sales to minors are still a problem. Federal and state laws abolishing cigarette vending machines would have a significant beneficial impact; with such machines accessible, laws forbidding sale to minors are completely ineffective, as shown in a recent study in the Washington, D.C., metropolitan area (*61*). Regulation on alcohol should also be increased. As with tobacco, there are many options short of total prohibition that would decrease consumption without stimulating a black market and associated criminal activities (*62*).

In principle, routine or random drug testing is justifiable for people in sensitive jobs, whose use of psychoactive drugs (whether licit or illicit) could endanger public safety. As the role of alcohol and other drugs in highway accidents is well documented (*8*), we believe that on-the-highway testing of drivers for alcohol on a nondiscriminatory basis at road blocks is justified as a protection for the innocent, and the U.S. Supreme Court has ruled that such tests are not unreasonable searches as specified in the U.S. Constitution (*63*). Moreover, lowering of the permissible legal limit (currently 0.10% in many jurisdictions) to 0.08% or 0.06% could have significant beneficial effects on highway safety (*8, 64*). However, although urine testing for other drugs has improved greatly in accuracy (*65*), a significant problem in inferring psychomotor impairment from test results is that whereas breath or blood tests give a real-time result, urine tests provide only a record of past use and therefore cannot determine whether a person is under the influence of a drug at the time the sample is obtained. Further research is needed for the development of noninvasive analytical methods for estimating concentrations of psychoactive drugs in blood.

The North American demand for drugs is the driving force that creates major socioeconomic and political stress for the producer countries, especially in Latin America. The United States and Canada should assist these countries in reducing their economic dependence on drug exports. We should recognize and acknowledge that U.S. export of tobacco (especially to developing countries) undercuts any principled opposition to coca or opium export by other countries. A trade deficit does not justify our continuing in the role of major world supplier of a highly toxic and addictive substance.

Concerning demand reduction through prevention education, treatment, and research. All kinds of prevention efforts should be expanded as part of a broad strategy of demand reduction. Perhaps the most effective single factor in achieving this goal would be a social consensus on the appropriate circumstances and amounts of drug use. To change attitudes, beliefs, and values at all levels of a society in order to achieve the desired consensus requires carefully planned, internally consistent, and sustained long-term programs of education aimed at different ages, cultures, and socioeconomic groups (*66*).

The time is long overdue to recognize officially, publicize, and incorporate into common speech and legislation the fact that tobacco (nicotine) and alcohol are potentially hazardous addicting drugs. We need to expunge from the language the phrases "alcohol and drugs" and "tobacco and drugs." This is not mere semantic nit-picking; language influences the way we think.

The ban on TV advertising of cigarettes should be strengthened to prevent its circumvention by the prominent, supposedly incidental, display of cigarette product names during TV coverage of sports and other public events. Current U.S. and Canadian policies forbidding advertisements for distilled spirits on television were a useful first step, but there is not yet a well-founded policy on alcohol advertising in either country. A flood of beer advertisements has appeared, appealing primarily to youth, and linking beer to sports and sexual interests; and international comparisons show that alcoholism can occur just as readily in predominantly beer- or wine-drinking as in spirit-drinking countries (*31*). To date, scientific studies have failed either to prove or to exclude a short-term effect of alcohol advertising on consumption (*64*). This is not surprising, given the ubiquity of drinking in films, TV, and print media, which probably have a greater impact on attitudes and behavioral norms than commercial advertising does. Nevertheless, we regard a progressive restriction of the right to advertise addictive drugs as an important and desirable first step in a long-term process of altering the present public perception of these substances as ordinary consumer products.

Ideally, classroom programs should not be drug-specific but should deal more broadly with the hazards of using psychoactive drugs. Integrated prevention efforts involving both the schools and the community are desirable. Finally, effective education is honest education; the educational message has to be the real dangers of each drug to the user and to society. It is useless to merely warn of the dangers of being caught, and health personnel (not law officers) should carry the drug message into the classrooms.

For specific populations with exceptionally severe drug problems, such as American Indian communities, or low-income African-American or Hispanic groups in major urban centers, effective prevention may be impossible without creating opportunities for economic advancement within a licit social framework and for enhanced self-respect through reinforcement of traditional social and cultural values.

Treatment should be available to all who desire it; long waiting lists are counterproductive. Having enough clinics to meet the demand will require very large investments, but these could be cost-effective in the long run. Adequate funding should be furnished for treatment research to test innovative therapeutic approaches, provided the research design will permit rigorous evaluation. Programs should be developed for making humane contact with addicts as a first step to treatment; needle exchanges may serve a useful purpose in this regard (*67*).

We should consider developing and testing treatment programs that incorporate an initial phase in which the addict's drug of choice is made available. This approach might serve as a lure to bring some

alienated users of heroin or cocaine into contact with health personnel, but it must be in the context of a genuine treatment and rehabilitation program. Many formidable practical difficulties would have to be overcome, not the least of which is to work out reliable methods of preventing the clinic itself from becoming a recruiting ground for new addicts (*68*).

A different medical approach is illustrated by methadone maintenance, in which opiate addicts are stabilized on a long-lasting, orally administered opiate (*69*). Many methadone programs—provided they employ adequate dosages—have achieved the successful social rehabilitation of a considerable fraction of addicts (about one-half to two-thirds), some of them continuing to take methadone, some eventually becoming opiate-free. Reduction of street crime by addicts enrolled in methadone programs is well documented. Experts agree that methadone maintenance should not be the sole treatment for heroin addicts, but this treatment modality is well enough established to warrant expansion to meet the need (*70–72*).

Some heroin addicts unquestionably benefit from drug-free residential environments (halfway houses). Extensive follow-up data show that some treatment is better than no treatment, but that a variety of therapeutic modalities is probably required to meet the needs of all heroin addicts (*71*). Although treatment programs of all types have achieved beneficial and humane results, there have also been practical difficulties, not the least of which is the relatively small proportion of addicts (especially to drugs other than opiates) who are treated during any given year (*73*). In addition, although some lessons can undoubtedly be learned from treatment experiences with heroin addicts, there is no agreement yet on appropriate treatment strategies for cocaine addicts (*74*).

The funding should be increased for basic and applied research on all aspects of the drug problem. We predict that neurochemical and neurobiologic research will yield new understandings about the mechanisms of the drug addictions. In the future, as in the past, such knowledge can be counted on to produce novel diagnostic, predictive, and therapeutic interventions. Specifically, learning more about the neurobiology and pharmacology of reward will lay a sounder basis for therapy. Testing for genetic vulnerability might permit better targeting of prevention efforts to those who are most vulnerable. Novel pharmacologic treatments that need to be developed include a long-acting agonist to supplant cocaine (analogous to methadone in opiate addiction), long-acting antagonists or immunization procedures, and drugs to facilitate detoxification and suppress craving. Finally, we need the patience to fund and carry out very long-term studies on the effectiveness of prevention education strategies; to do these studies well will be very expensive (*75*).

Concluding Remarks

An atmosphere of desperation, which seems to prevail today in the War on Drugs, is not conducive to sound policy decisions or effective legislation. Until calm and reason can prevail, it may be better to do nothing than to take actions rashly that will make matters worse. If we strike the right balance in drug policies, as we have suggested here, it should be possible to bring about a reduction in the demand for psychoactive drugs. A reduced demand for drugs offers the only real hope of eventually achieving, not a drug-free society, but one with substantially less drug abuse.

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3. Examples of long-established legislation that protects as well as informs are laws requiring motorcycle helmets and automobile safety belts, pasteurization of milk, fluoridation of municipal drinking water supplies, and immunizations of school children. The history of drug regulation in the United States is recounted by P. Temin [*Taking Your Medicine* (Harvard Univ. Press, Cambridge, MA, 1980)].
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8. A drug that delays reaction time or clouds judgment can endanger the lives of others if the user operates complex machinery or vehicles. A drug that causes violent paranoid behavior can endanger all who come in contact with the user. Behavioral effects, even at the moderate intensity sought by the average user, can present a major threat to society. For example, moderate doses of alcohol imbibed in ordinary social drinking are sufficient to cause a measurable decrement of performance in tests of reaction time, vigilance, or judgment, making for dangerous driving and hazardous operation of complex equipment [H. Moskowitz and C. D. Robinson, *Effects of Low Doses of Ethanol on Driving-Related Skills: A Review of the Evidence* (Department of Commerce, National Technical Information Service, Washington, DC, 1988]. Similar findings apply to marijuana [J. A. Yesavage, V. O. Leirer, M. Denari, L. E. Hollister, *Am. J. Psychiatry* **142**, 1325 (1985)]. In general, any drug taken for the purpose of altering mood and behavior can, in some circumstances, endanger other people.
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19. We do not know to what extent predisposition is conditioned by experience, caused by endogenous depression or other psychiatric disorders, molded by drug-induced changes in brain chemistry, or genetically predetermined. We do not know whether, for a given person, the predisposition applies to all addicting drugs or is drug-specific; in alcoholism, it seems to be drug-specific. Attempts are being made to identify genetic markers of predisposition to addiction (especially to alcohol) [R. H. Pickens and D. S. Svikis, Eds., *Biological Vulnerability to Drug Abuse* (*NIDA Res. Monogr. 89*, 1988), pp. 1–180; J. B. Martin, in *Molecular and Cellular Aspects of the Drug Addictions*, A. Goldstein, Ed. (Springer-Verlag, New York, 1989), p. 198; K. Blum *et al.*, *J. Am. Med. Assoc.* **263**, 2055 (1990)].
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35. The rapid growth of cocaine use over the past decade has been attributed, at least in part, to the glamorization of cocaine in the mass media and its use by sports and entertainment celebrities [A. Crittenden and M. Ruby, *Addictions* **21**, 62 (1974)].
36. Y. L. Yao, *Bull. Narc.* **10** (no. 1), 1 (1958).
37. Likely consequences of legalizing heroin in the United States were discussed by one of us over a decade ago during a previous war on drugs [A. Goldstein, *J. Drug Issues* **9**, 341 (1979)].
38. Editorial, "Why rush to surrender on drugs," *New York Times*, 14 December 1989.
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40. C. E. Terry, Health Officer for Jacksonville, FL, persuaded the city council to set up a clinic at which known addicts could receive free prescriptions for the drugs they desired, in any amounts they wished [C. E. Terry and M. Pellens, *The Opium Problem*, reprinted with foreword by J. C. Ball and preface by C. Winick (Patterson Smith, Montclair, NJ, 1970)]. The prescriptions, of which duplicates were sent to Terry's office, bore the names and addresses of the recipients, so that he was able to compile a detailed list of the individual users and the types and amounts of the drugs they habitually used. The results showed, remarkably, that almost 1% of the entire population of Jacksonville were habitual users. As Terry noted, this figure was a gross underestimate; at least half the population were children under the age of 15, who did not use drugs. Not included were over-the-counter purchases from pharmacists (still legal at that time) or direct provision of drugs to affluent patients by their own physicians (the clinic served primarily indigent or low-income users). Moreover, it was considered likely that the level of drug use in large urban centers was much higher than in Jacksonville (1913 population: 67,209) (*39*).
41. The immediate post-repeal increase in consumption in the United States was 43%, which led to a near doubling of the cirrhosis death rate. In addition, reflecting the inverse relation between real price and consumption, a 50% reduction in the price of alcohol in Ontario led to a 100% increase in consumption (*24*). Similarly, in California, a 50% increase in real income between 1953 and 1975 was associated with a 50% rise in per capita alcohol consumption [R. Bunce, *Alcoholic Beverage Consumption, Beverage Prices and Income in California 1952–1975*, report no. 6, June 1976 (State Office of Alcoholism, Sacramento, CA]. Thus, simultaneous removal of legal constraints on currently illicit drugs, and lowering of drug prices, would probably lead to at least a tripling of consumption, and this in turn would result in proportionately larger increases in all the health and social costs arising from heavy use.
42. D. T. Courtwright, "Drug legalization and drug trafficking in historical and economic perspective," paper presented at Banbury Center conference on addictions, Banbury Center of the Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, 25 to 27 January 1990.
43. Canadian health care costs due to alcohol-related diseases were calculated at some $6.0 billion (Canadian), reduced labor productivity costs due to alcohol amounted to $2.5 billion, social welfare costs caused by alcohol totalled about $1.5 billion, and alcohol-related motor vehicle accidents were estimated to cost $0.3 billion. The total of these estimates comes to $10.3 billion. Revenue generated for all levels of government by the sale of alcohol in the same year was only $5.1 billion [*Statistics on Alcohol and Drug Use in Canada and Other Countries*, vol. 1, *Statistics on Alcohol Use, Data Available by 1988*, compiled by M. Adrian, P. Jull, R. Williams (Addiction Research Foundation, Toronto, 1989) Table 23]. Comparable U.S. data for a population about ten times greater were about $117 billion in social and health costs, compared to an estimated alcohol revenue of $10.3 billion [*Alcohol and Health, Sixth Special Report to the U.S. Congress* (Department of Health and Human Services, National Institute on Alcohol Abuse and Alcoholism, Rockville, MD, 1987, Table 13); *Annual Statistical Review 1983/84* (Distilled Spirits Council of the United States, Washington, DC, 1984, Table 42); *Brewers Almanac 1987* (Beer Institute, Washington, DC, 1987, Tables 59, 60, 65)]. The Canadian estimates of alcohol-related revenue include not only excise taxes and duties and licensing fees but also corporate income taxes and real estate taxes paid by the alcohol beverage industry, profits earned by the provincial government alcohol sales monopolies, and other indirect revenue. In contrast, the U.S. figures refer only to direct taxes on alcohol and therefore underestimate the total benefits to federal, state, and municipal governments.

44. J. L. Steffens, *The Autobiography of Lincoln Steffens* (Harcourt Brace, New York, 1931).
45. J. D. Swisher and T. W. Hu, *Int. J. Addict.* **19**, 57 (1984).
46. M. R. Burt, *Am. J. Drug Alcohol Abuse* **82**, 419 (1981).
47. I. Leveson, Ed. *Quantitative Explorations in Drug Abuse Policy* (Spectrum, Jamaica, NY, 1980).
48. Data from *NIDA Household Survey on Drug Abuse, Population Estimates, 1988*, and supplemental data quoted in *HHS News* (Department of Health and Human Services, Washington, DC, 31 July 1989). For this population, daily users of heroin probably do not exceed a few hundred thousand, but heroin users are known to be underrepresented in the household population. Regular users of caffeine (as coffee, tea, chocolate, and soft drinks) are estimated conservatively at 90% of the population [R. M. Gilbert, *Prog. Clin. Biol. Res.* **158**, 185 (1984)].
49. Caffeine, although it is the most widely used psychoactive drug, appears to be relatively benign although not without dangers to users at high dosages [P. W. Curatolo, *Ann. Intern. Med.* **98**, 641 (1983); this refers to our Table 1].
50. *Hard-Core Cocaine Addicts: Measuring—and Fighting—the Epidemic*, draft staff report prepared for the use of the Committee on the Judiciary, U.S. Senate, 10 May 1990 (supervised by M. A. R. Kleiman).
51. The smoking route delivers a drug to the blood flowing through the lungs. This blood, carrying a high concentration of cocaine, reaches the brain within a few seconds and without dilution. The chemical properties of crack (cocaine free base) suit it for efficient delivery by this convenient route. In this respect crack is much like nicotine.
52. However, the enormous sums of money being generated by the drug traffic imply that cocaine use (as distinct from trafficking) has a major middle- and upper-class component.
53. A strictly rational approach is impractical because public acceptance and political feasibility of legislation depends not only on scientific evidence but also on long-established values and practices. It is extremely unlikely, for example, that present-day North American society would agree to put alcohol under stricter control than marijuana, even if currently available scientific evidence were to suggest that this is warranted. Polls show that the great majority, including those who were themselves users of marijuana, did not favor its legalization [Gallup Poll (Canada), 2 September 1985; see also R. C. Peterson (*54*)].
54. R. C. Peterson, Ed., *Marijuana Research Findings: 1980* (*NIDA Res. Monogr. 31*, 1980); K. O. Fahr and H. Kalant, Eds., *Cannabis and Health Hazards: Proceedings of an ARF/WHO Scientific Meeting* (Addiction Research Foundation, Toronto, 1983).
55. M. Marriott, "New York's worst drug sites: persistent markets of death," *New York Times*, 1 June 1989, p. 1.
56. In President Bush's fiscal 1991 budget request for the "National Drug Control Strategy," 29% is for interdiction and other offshore activities and 42% is for law enforcement, for a total 71% for supply reduction. Demand reduction totals 29%. Data from Office of National Drug Control Policy.
57. A. Hamid, paper presented at Banbury Center conference on addictions, Banbury Center of the Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, 25 to 27 January 1990.
58. In Canada the legal status of cannabis has not been changed, but prosecutors do not oppose the use of discretionary powers by judges in sentencing, so as to grant absolute or conditional discharges, or impose only a modest fine, in cases of possession of small amounts for personal use. As pointed out by Single [*J. Public Health Policy* **10**, 456 (1989)], decriminalization is not an appropriate term for the lessening of penalties for marijuana possession. Consequently, the fact that substantial increases in use did not occur in certain states does not indicate what would happen over a period of years if the possession and use of this drug were actually decriminalized. Very little solid data have yet been published in support of the frequent journalistic assertions that the relaxed Dutch policy has produced no increase in the use of cannabis or other psychoactive drugs (G. F. van de Wijngaart, *J. Drug. Issues* **18**, 481 (1988); E. L. Engelsman, *Br. J. Addict.* **84**, 211 (1989); N. Dorn *et al.*, *ibid.*, p. 989].
59. *U.S. Sentencing Commission Guidelines*, pursuant to Sec. 994(a) of Title 28, U.S. Code, as amended November 1, 1989; S. Taylor, Jr., *American Lawyer* **12**, 65 (1990).
60. M. A. R. Kleiman, *Marijuana: Costs of Abuse, Costs of Control* (Greenwood, New York, 1989).
61. R. M. Davis and A. Lyman, Hearings before the Subcommittee on transportation and hazardous materials of the committee on energy and commerce, House of Representatives (Serial no. 101–85, Government Printing Office, Washington, DC, 1989). A possibly useful step would be to restrict sale of tobacco to liquor stores, because they are accustomed to excluding minors as customers, and they are monitored as to their compliance with requiring proof of age.
62. Happy hours and other devices to promote increased consumption could be forbidden. A system like the British "pub closing hours" could be instituted. Tougher enforcement and tougher penalties on drunk driving (or, for that matter, driving in an impaired condition due to any drug) could be implemented. Sale of distilled liquors, wine, and beer by the package could be restricted to licensed liquor stores or even to state-operated retail outlets as in some states now and to a major extent in the Canadian provinces.
63. "Court approves sobriety checks along the road" *The New York Times*, 15 June 1990, p. 1.
64. J. M. Moskowitz, *J. Stud. Alcohol* **50**, 54 (1989); L. T. Kozlowski, R. B. Coambs, R. G. Ferrence, E. M. Adlaf, *Can. J. Public Health* **80**, 452 (1989).
65. R. L. Foltz, A. F. Fentiman, R. B. Foltz, *GC/MS Assays for Abused Drugs in Body Fluids* (NIDA Res. Monogr. 32, 1980), pp. 1–198; R. L. Hawks and C. N. Chia, Eds., *Urine Testing for Drugs of Abuse* (*NIDA Res. Monogr. 73*, 1986).
66. It is now recognized that neither mere drug information nor stern warnings about the dangers are effective. Recent programs, such as that developed by National Institute on Alcohol Abuse and Alcoholism (*Helping Your Students Say No to Alcohol and Other Drugs*, Dept. of Health and Human Services, Alcohol, Drug Abuse, and Mental Health Administration, 1989) are aimed at the lower grades, which do not yet present drug abuse problems. They have tried to teach children to make value judgments on all matters (including but not limited to drug use), to have confidence in their own ability to do so, to resist peer pressure that goes against their own judgments, and to find alternative drug-free outlets for their drives and curiosity. Disappointingly, evaluation has not shown these elements to be effective in changing attitudes and behaviors; only an honest, calm, health-based message has proved to be effective (*64*). Total expenditures on prevention education directed toward alcohol and other drugs by all federal and state departments and agencies in the United States in the current year is about $0.75 billion, 7.5% of the proposed budget for the war on drugs. (Information from Office of the Director, NIAAA.)
67. As the addict group is now a major infectious focus of the acquired immunodeficiency syndrome (AIDS) epidemic in the United States, it is essential to educate them in how to stop the spread of AIDS. Means of education include informational programs about human immunodeficiency virus (HIV) transmission by blood and unsafe sexual practices, distribution of free condoms to men and women, free contraceptive advice and supplies for women, as well as access to sterilization and early abortion for HIV-positive women. Needle exchanges may be helpful, primarily when used to bring intravenous drug users into a comprehensive treatment program [G. J. Hart *et al.*, *AIDS* **3**, 261 (1989)]. However, before the AIDS epidemic a British experiment that provided sterile equipment and pure heroin to registered addicts did not reduce the incidence of blood-borne infections (*16*); addicts shared their "sterile" equipment. Ironically, HIV is a fragile virus, easy to kill with brief heating or exposure to a disinfectant. Thus, simple means of sterilizing equipment are readily available to addicts, just as are condoms for preventing sexual transmission. But addicts do not necessarily govern their impulsive behavior according to rational guidelines, and persistent educational efforts are required. See *AIDS and Intravenous Drug Use: Future Directions for Community-Based Prevention Research*, C. G. Leukefeld, R. J. Battjes, Z. Amsel, Eds. (*NIDA Res. Monogr. 93*, 1990).
68. A. S. Trebach, *The Heroin Solution* (Yale Univ. Press, New Haven, CT, 1982); A. Goldstein, *Arch. Gen. Psychiatry* **33**, 353 (1976)]. A similar medical model was tried in England for heroin addicts, but is now largely superseded by oral methadone maintenance. Heroin was not legalized; the drug remained illegal, but registered addicts were provided with it and with sterile syringes and needles [H. F. Judson, *Heroin Addiction in Britain: What Americans Can Learn from the English Experience* (Harcourt Brace Jovanovich, New York, 1974)]. The objective was to establish therapeutic contact and reduce the social harm caused by crimes committed by addicts in order to purchase drugs at high prices on the black market. Few of the expected favorable results were observed, however, probably because multiple intravenous injections of heroin every day represented a continuation rather than a change in addict lifestyle [J. Kaplan, *The Hardest Drug: Heroin and Public Policy* (Univ. of Chicago Press, Chicago, 1983); G. D. Wiepert, P. T. d'Orban, T. H. Bewley, *Br. J. Psychiatry* **134**, 14 (1979). No attempts have been made to apply this methodology to cocaine addicts.
69. V. P. Dole and M. E. Nyswander, *Arch. Intern. Med.* **120**, 19 (1967); V. P. Dole, *J. Am. Med. Assoc.* **260**, 3025 (1988).
70. S. S. Wilmarth and A. Goldstein, *Therapeutic Effectiveness of Methadone Maintenance Programs in the Management of Drug Dependence of Morphine Type in the United States* (World Health Organization, Offset Publication no. 3, Geneva, 1974); J. Holmstrand, E. Abgaard, L.-M. Gunne, *Clin. Pharmacol. Ther.* **23**, 175 (1978); B. A. Judson and A. Goldstein, *Drug Alcohol Depend.* **10**, 383 (1982); D. N. Nurco, T. E. Hanlon, T. W. Kinlock, K. R. Duszynski, *Compr. Psychiatry* **30**, 391 (1989).
71. S. B. Sells and D. D. Simpson, *Br. J. Addict.* **75**, 117 (1980); *Studies of the Effectiveness of Treatments for Drug Abuse*, S. B. Sells, Ed. (Ballinger, Cambridge, 1974–1976), vols. 1 to 5.
72. Methadone programs must be under the control of medical authorities so that adequate dosages can be used; political and moralistic concerns have often interfered with treatment efficacy by mandating dosage ceilings that are too low and too short a limit on the duration of treatment (*69*). An urgent need is to make widely available to physicians the long-acting methadone congener LAAM (levo-alphaacetylmethadol), which is in several respects superior to methadone itself (J. D. Blaine and P. F. Renault, Eds., *Rx: 3x/week LAAM Alternative to Methadone* (NIDA Res. Monogr. 8, 1976); B. A. Judson and A. Goldstein, *Drug Alcohol Depend.* **10**, 269 (1982).
73. R. Hartnoll, R. Lewis, M. Mitcheson, S. Bryer, *Lancet* **i**, 203 (1985); B. L. Levin, J. H. Glasser, C. L. Jaffee, *Am. J. Public Health* **78**, 1222 (1988).
74. The medical approach cannot be used in preventing recruitment of new addicts, except possibly to deglamorize addiction. Whenever a clinic offers psychoactive drugs as part of a treatment plan, methods have to be developed for excluding young experimenters who are not yet addicted but seek a convenient source of drugs.
75. M. A. Pentz *et al.*, *Ann. Med.* **21**, 219 (1989); M. A. Pentz *et al.*, *J. Am. Med. Assoc.* **261**, 3259 (1989); C. S. Bell and R. Battjes, Eds., *Prevention Research: Deterring Drug Abuse Among Children and Adolescents* (*NIDA Res. Monogr. 63*, 1985). Educational efforts achieve their effects relatively slowly as compared with changes in the law or in the price of drugs, so it is essential to support education programs long enough to give them a chance to achieve whatever results they are capable of, and to permit scientific evaluation of their efficacy.
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