

## *Alcohol and Illicit Drugs*

### *The Role of Risk Perceptions*

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**T**he general domain of behaviors to which this chapter is addressed is the use of licit and illicit drugs.<sup>1</sup> It might also be called substance use or, more commonly but less precisely, substance abuse.

I will begin with a consideration of what might distinguish this domain of behaviors from most or all other risk behaviors being dealt with in the Reducing Adolescent Risk Conference—namely, suicide, gambling, pregnancy, HIV/STD, and tobacco use. My focus will then turn to a consideration of the degree to which these various substance-using behaviors are part of larger, overarching constructs versus the degree to which they are unrelated behaviors. That will be followed by a discussion of what I and my colleagues on the Monitoring the Future study have learned about the importance of risk perceptions with regard to substance use and whether they are important determinants of substance use.

#### BOUNDARIES AND DEFINITIONS

Perhaps more than any of the other risk areas, substance abuse comprises a wide

array of specific behaviors—namely use of each of many substances—which provides the opportunity to study multiple instances of the behaviors and also variations among them. For the most part, the substances usually encompassed in this domain are psychoactive substances and include alcohol in its various forms, tobacco, a large and ever-growing list of illegal drugs (marijuana, cocaine, hallucinogens, heroin, ecstasy, etc.), and legally controlled psychotherapeutic drugs (stimulants, sedatives, tranquilizers, and some narcotic drugs other than heroin). A number of legal substances commonly used for their psychoactive effects may be included in this domain of behavior. Alcohol and tobacco have long been considered part of the domain, as well as inhalants. Nearly all inhalants are legal products that are not even manufactured as psychoactive substances but are often used for that purpose by adolescents—in particular younger ones. Indeed, inhalants are the only class of drugs defined by their mode of administration rather than by their pharmacological properties.

The domain might be defined to include noncontrolled (or “over-the-counter”) drugs

taken for their effects on wakefulness, energy level, sleep, and hunger. Although the inclusion of this last set may seem less intuitively obvious, these substances are taken for their psychoactive effects and can have deleterious effects on the users. In addition, as we will see below, their use actually is correlated with the use of the other psychoactive substances listed above. Including over-the-counter drugs in the domain may help us to parse out some of the underlying causes of substance abuse behaviors, I would argue, since their use is not illicit or deviant, as is the use of many of the other substances just listed.

The domain of substance use might even be stretched to include the use of some nonpsychoactive performance-enhancing or physique-enhancing substances, such as steroids. Characteristics that steroids share with most of the drugs just listed are that they are controlled substances, are sold illegally, and can have serious adverse consequences. Generally, they are not used for their psychoactive effects, however, although they may have some.

In sum, the constellation of behaviors encompassed by the definition of substance use is potentially quite broad. What is included in or excluded from the definition may partly depend on the degree to which these different behaviors have common motives for use, common status in society, or some degree of positive correlation with the other behaviors included in the domain. Insofar as there is a pattern of intercorrelation among them, studying them conjointly may provide an understanding of what underlies and influences them.

#### DISTINGUISHING CHARACTERISTICS OF THIS AREA

What makes the substance use domain of behavior potentially useful for gaining a

general understanding of the dynamics of risk behavior? For one, this multitude of substances provides *multiple opportunities* to examine how each relates to specific other factors in the intrapersonal and interpersonal spheres. So, for example, we can look at how certain attitudes or beliefs (e.g., perceived risk) relate to behavior not just for one drug but for many. Seizing these opportunities creates potential for determining the extent to which certain associations replicate both across substances and across time.

Because data on youth substance use have been systematically collected over a long time period and in a consistent manner across both time and drugs, researchers possess the *capacity* to study a number of these instances. There are several time-series studies in the substance use field, including the National Household Survey on Drug Abuse (NHSDA), Monitoring the Future (MTF), and more recently, the Youth Risk Behavior Study (YRBS). Of these, MTF has the most surrounding attitudinal, belief, and experiential measures, and YRBS the least (by design). YRBS, on the other hand, contains the broadest array of youth risk behaviors.

Furthermore, various drugs have been introduced into the general population at different points in time. These diverse time periods make it easier to separate the sequelae of intrapersonal and interpersonal events related to each drug and to determine how robust they are across different historical contexts.

Clearly, the various substances differ in the probability, nature, and severity of their adverse consequences. Of special importance, they also vary in length of time between initiation of the behavior and the likely occurrence of those adverse outcomes. For example, cigarettes primarily carry very long-term risks, cocaine quite serious intermediate-term risks, and PCP (phencyclidine) very immediate and severe short-term risks. Such differences make it possible to examine

variations in risk perceptions that may relate to the time horizon of the risk. I have argued elsewhere (Johnston, 1991b) that the lag time in the occurrence of the adverse consequences is an important determinant of how long it will take for a natural corrective cycle to set in—one in which use of the drug eventually begins to recede.

The drugs differ even in how certain it is that various consequences even exist. There is little disagreement that particular sexually transmitted diseases (STDs) have specific adverse outcomes, but there is considerable disagreement, even among scientists, about whether marijuana use is dependence producing or whether its use contributes to the likelihood that a person will advance to the use of other illicit drugs.

A final distinguishing characteristic of this domain of behaviors is that taking psychoactive substances can have direct chemical effects on the neurological reinforcement systems. Those effects can lead to lasting alterations of those systems, thus giving rise to dependence or addiction. Whether some other risk behaviors—such as gambling, overeating, and certain sexual behaviors—have similar effects is an important question.

#### THE STRUCTURE OF ASSOCIATIONS AMONG DRUG-USING BEHAVIORS

It is a long-established fact that a great many of the various drug-taking behaviors in this domain tend to be highly intercorrelated (see Akers, 1984; Elliott & Huizinga, 1984; Johnston, 1973; Kandel, 1975; Yamaguchi & Kandel, 1984). Indeed, Kandel and her colleagues have established empirically that there tend to be fairly regular stages of involvement in various substances that fit rather well with Gutman scaling (Yamaguchi & Kandel, 1984). Either tobacco or alcohol usually comes first in the sequence; then the

other of those two; then marijuana; then any of a number of the other illicit (so-called harder) drugs. Our own analyses tend to confirm those regularities. They have additionally suggested that the use of some of the drugs in the last category that are considered among the most dangerous (such as crack or heroin) is usually preceded by use of some of the others in that group considered as less dangerous (such as amphetamines, tranquilizers, or LSD). We also find that inhalants tend to be another early-stage drug class in addition to alcohol and tobacco. Indeed, there is a fairly strong correlation between the degree to which each drug is seen as dangerous and the percentage of the youth population that uses it (Johnston, O'Malley, & Bachman, 2001).

Based on a new analysis of MTF data, Table 8.1 presents measures of pairwise associations among usage measures for nearly all the substances discussed so far, except the over-the-counter drugs, based on data from the 12th-grade students surveyed in 2001.<sup>2</sup> The use of most drugs is represented in the analysis by the self-reported frequency of use during the 12-month period preceding the survey. (Frequency of use for alcohol and cigarettes are measured in the prior 30-day interval, because these behaviors are so much more prevalent than the others.) Both product-moment correlations and gamma statistics were run, but only the gammas are shown in the table. The gamma statistic (Goodman & Kruskal, 1979) is a nonparametric statistic indicating the degree of ordinal association between two variables. It ranges from +1 to -1, with 0 indicating no association, much like a Pearson product-moment correlation. What Table 8.2 shows is the very high degree of association among all these disparate drug-using behaviors—even including the use of steroids and inhalants. Indeed, the Pearson product-moment correlations among them (not shown) all were significant at below the

*(text continues on page 62)*

Table 8.1 Associations Among the Different Substances (and Dangerous Driving)

|                                  | 1. FREQ.<br>CIGS<br>SMKD/ 30 | 2. FREQ.<br>DRNK/ 30<br>DAY | 3. 5+DRK<br>ROW/LST<br>2WK | 4. FREQ.<br>MARIJ/ 12<br>MO | 5. FREQ.<br>LSD/ 12<br>MO | 6. FREQ.<br>OTH PSYD/<br>12 MO | 7. FREQ.<br>COKE/ 12<br>MO | 8. FREQ.<br>CRACK/<br>12 MO | 9. FREQ.<br>AMPH/<br>12 MO | 10. FREQ.<br>ICE/ 12<br>MO | 11. FREQ.<br>BRBT/ 12<br>MO |
|----------------------------------|------------------------------|-----------------------------|----------------------------|-----------------------------|---------------------------|--------------------------------|----------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|
| 2. FREQ. DRINK/ 30 DAY           | 0.59                         |                             |                            |                             |                           |                                |                            |                             |                            |                            |                             |
| 3. 5+DRINKS ROW/LST 2WK          | 0.61                         | 0.92                        |                            |                             |                           |                                |                            |                             |                            |                            |                             |
| 4. FREQ. MARIJ/ 12 MO            | 0.63                         | 0.62                        | 0.62                       |                             |                           |                                |                            |                             |                            |                            |                             |
| 5. FREQ. LSD/ 12 MO              | 0.68                         | 0.64                        | 0.65                       | 0.87                        |                           |                                |                            |                             |                            |                            |                             |
| 6. FREQ. OTH PSYD/ 12 MO         | 0.68                         | 0.67                        | 0.68                       | 0.88                        | 0.94                      |                                |                            |                             |                            |                            |                             |
| 7. FREQ. COKE/ 12 MO             | 0.71                         | 0.68                        | 0.70                       | 0.87                        | 0.90                      | 0.90                           |                            |                             |                            |                            |                             |
| 8. FREQ. CRACK/ 12 MO            | 0.72                         | 0.71                        | 0.74                       | 0.83                        | 0.89                      | 0.91                           | 0.98                       |                             |                            |                            |                             |
| 9. FREQ. AMPH/ 12 MO             | 0.59                         | 0.55                        | 0.57                       | 0.65                        | 0.81                      | 0.81                           | 0.82                       | 0.83                        |                            |                            |                             |
| 10. FREQ. ICE/ 12 MO             | 0.71                         | 0.51                        | 0.56                       | 0.80                        | 0.91                      | 0.87                           | 0.94                       | 0.92                        | 0.85                       |                            |                             |
| 11. FREQ. BRBT/ 12 MO            | 0.60                         | 0.59                        | 0.60                       | 0.72                        | 0.84                      | 0.83                           | 0.84                       | 0.86                        | 0.87                       | 0.85                       |                             |
| 12. FREQ. TRQL/ 12 MO            | 0.63                         | 0.61                        | 0.62                       | 0.75                        | 0.85                      | 0.86                           | 0.85                       | 0.86                        | 0.86                       | 0.88                       | 0.92                        |
| 13. FREQ. HEROIN/ 12 MO          | 0.65                         | 0.67                        | 0.69                       | 0.81                        | 0.91                      | 0.91                           | 0.94                       | 0.96                        | 0.85                       | 0.95                       | 0.85                        |
| 14. FREQ. OTH NARC/ 12 MO        | 0.65                         | 0.63                        | 0.64                       | 0.80                        | 0.89                      | 0.88                           | 0.87                       | 0.86                        | 0.83                       | 0.87                       | 0.87                        |
| 15. FREQ. INHAL/ 12 MO           | 0.61                         | 0.54                        | 0.55                       | 0.64                        | 0.75                      | 0.75                           | 0.80                       | 0.76                        | 0.67                       | 0.83                       | 0.73                        |
| 16. FREQ. STEROIDS/ 12 MO        | 0.42                         | 0.63                        | 0.69                       | 0.38                        | 0.50                      | 0.30                           | 0.58                       | 0.82                        | 0.72                       | 0.41                       | 0.63                        |
| 17. ANY ILLICIT INDEX            | 0.61                         | 0.61                        | 0.61                       | 0.96                        | 0.92                      | 0.94                           | 0.93                       | 0.91                        | 0.72                       | 0.82                       | 0.87                        |
| 18. ANY ILLICIT OTHER<br>THAN MJ | 0.63                         | 0.60                        | 0.62                       | 0.78                        | 0.95                      | 0.95                           | 0.95                       | 0.94                        | 0.83                       | 0.88                       | 0.94                        |
| 19. FREQ. ACCDNTS/12 MO          | 0.24                         | 0.24                        | 0.24                       | 0.25                        | 0.29                      | 0.36                           | 0.40                       | 0.36                        | 0.30                       | 0.33                       | 0.32                        |
| 20. FREQ. TICKETS/ 12 MO         | 0.31                         | 0.33                        | 0.37                       | 0.33                        | 0.38                      | 0.47                           | 0.41                       | 0.42                        | 0.31                       | 0.08                       | 0.38                        |

(Continued)

Table 8.1 (Continued)

|                                  | 12. FREQ.<br>TRQL/ 12<br>MO | 13. FREQ.<br>HEROIN/<br>12 MO | 14. FREQ.<br>OTH NARC/<br>12 MO | 15. FREQ.<br>INHL/ 12<br>MO | 16. FREQ.<br>STER/ 12<br>MO | 17. ANY<br>ILLCIT<br>INDEX | 18. OTHER<br>THAN MJ<br>INDEX | 19. FREQ.<br>ACCIDNTS/<br>12 MO |
|----------------------------------|-----------------------------|-------------------------------|---------------------------------|-----------------------------|-----------------------------|----------------------------|-------------------------------|---------------------------------|
| 2. FREQ. DRINK/ 30 DAY           |                             |                               |                                 |                             |                             |                            |                               |                                 |
| 3. 5+DRINKS ROW/LST 2WK          |                             |                               |                                 |                             |                             |                            |                               |                                 |
| 4. FREQ. MARIJ/ 12 MO            |                             |                               |                                 |                             |                             |                            |                               |                                 |
| 5. FREQ. LSD/ 12 MO              |                             |                               |                                 |                             |                             |                            |                               |                                 |
| 6. FREQ. OTH PSYD/ 12 MO         |                             |                               |                                 |                             |                             |                            |                               |                                 |
| 7. FREQ. COKE/ 12 MO             |                             |                               |                                 |                             |                             |                            |                               |                                 |
| 8. FREQ. CRACK/ 12 MO            |                             |                               |                                 |                             |                             |                            |                               |                                 |
| 9. FREQ. AMPH/ 12 MO             |                             |                               |                                 |                             |                             |                            |                               |                                 |
| 10. FREQ. ICE/ 12 MO             |                             |                               |                                 |                             |                             |                            |                               |                                 |
| 11. FREQ. BRBT/ 12 MO            |                             |                               |                                 |                             |                             |                            |                               |                                 |
| 12. FREQ. TRQL/ 12 MO            |                             |                               |                                 |                             |                             |                            |                               |                                 |
| 13. FREQ. HEROIN/ 12 MO          | 0.88                        |                               |                                 |                             |                             |                            |                               |                                 |
| 14. FREQ. OTH NARC/ 12 MO        | 0.88                        | 0.91                          |                                 |                             |                             |                            |                               |                                 |
| 15. FREQ. INHAL/ 12 MO           | 0.75                        | 0.75                          | 0.75                            |                             |                             |                            |                               |                                 |
| 16. FREQ. STEROIDS/ 12 MO        | 0.67                        | 0.66                          | 0.69                            | 0.57                        |                             |                            |                               |                                 |
| 17. ANY ILLICIT INDEX            | 0.88                        | 0.93                          | 0.91                            | 0.68                        | 0.48                        |                            |                               |                                 |
| 18. ANY ILLICIT OTHER<br>THAN MJ | 0.94                        | 0.95                          | 0.95                            | 0.75                        | 0.60                        | n/a                        |                               |                                 |
| 19. FREQ. ACCDNTS/12 MO          | 0.34                        | 0.44                          | 0.37                            | 0.25                        | 0.27                        | 0.25                       | 0.31                          |                                 |
| 20. FREQ. TICKETS/ 12 MO         | 0.39                        | 0.34                          | 0.40                            | 0.30                        | 0.43                        | 0.32                       | 0.35                          | 0.47                            |

Table 8.2 Associations Between Use of Over-the-Counter Drugs and Other Substances

|                               | 1. FREQ.<br>MJ/LAST<br>12MO | 2. ILLICIT<br>OTH THAN<br>MJ | 3. FREQ.<br>CIGS<br>SMKD/ 30<br>DAY | 4. FREQ.<br>ALC/ 30<br>DAY | 5. 5+DRNK<br>/ LAST 2<br>WK | 6. FREQ.<br>DIET PILLS/<br>12 MO | 7. FREQ.<br>STA-<br>AWAKE/ 12<br>MO |
|-------------------------------|-----------------------------|------------------------------|-------------------------------------|----------------------------|-----------------------------|----------------------------------|-------------------------------------|
| 2. ANY ILLICITS OTHER THAN MJ | 0.75                        |                              |                                     |                            |                             |                                  |                                     |
| 3. FREQ. CIGS SMKD/ 30 DAY    | 0.60                        | 0.60                         |                                     |                            |                             |                                  |                                     |
| 4. FREQ. ALC/ 30 DAY          | 0.62                        | 0.62                         | 0.55                                |                            |                             |                                  |                                     |
| 5. 5+DRNK / LAST 2 WK         | 0.64                        | 0.67                         | 0.57                                | 0.92                       |                             |                                  |                                     |
| 6. FREQ. DIET PILLS/ 12 MO    | 0.29                        | 0.45                         | 0.43                                | 0.31                       | 0.27                        |                                  |                                     |
| 7. FREQ. STA-AWAKE/ 12 MO     | 0.49                        | 0.63                         | 0.49                                | 0.48                       | 0.54                        | 0.66                             |                                     |
| 8. FREQ. LOOK-A-LIKE/ 12 MO   | 0.51                        | 0.73                         | 0.50                                | 0.50                       | 0.58                        | 0.67                             | 0.82                                |

.0001 level, with the exception of a few of the associations related to steroid use.<sup>3</sup>

Less obvious to include in this domain of behavior, perhaps, is the use of over-the-counter drugs for functional reasons such as losing weight or staying awake. But these behaviors also turn out to be correlated with the use of licit and illicit psychoactive drugs (see Table 8.2<sup>4</sup>). For example, of those high school seniors in the class of 2000 who were surveyed in the MTF study, only 9% of those who never used an illicit drug reported diet pill use. This compares with 14% of those who had ever used marijuana but no other illicit drug and 35% of those who had ever used an illicit drug other than marijuana. We (Osgood, Johnston, O'Malley, & Bachman, 1988) and others have argued that a propensity toward deviance explains much of the variance in individual substance use measures, as will be discussed below. But the connection found with the over-the-counter drugs raises the question of whether there might be another underlying construct, such as a propensity to use psychoactive chemicals of all kinds to alter mood.

In fact, in the early years of the MTF study, we even included the use of beverages containing caffeine (colas, coffee, and tea) to test that hypothesis, and we found some degree of positive association between the use of even these very common and traditionally licit substances and the degree of involvement with illicit drugs (e.g., Bachman, Johnston, & O'Malley, 1984).

#### THE STRUCTURE OF ASSOCIATIONS WITH OTHER RISK BEHAVIORS

As alluded to earlier, there is a substantial literature showing that both licit and illicit drug use are largely explainable in terms of a more general propensity toward deviance of any kind. Some years ago the Jessors and

their colleagues (Donovan & Jessor, 1985; Jessor & Jessor, 1977) described the more general domain as "problem behaviors." They posited that a variety of deviant behaviors form what they describe as a syndrome caused by a general latent variable they label as "unconventionality." Even earlier, Johnston (1973), working with a national sample of young males, found that the use of all psychoactive drugs, both legal and illegal, was strongly correlated with an index of non-drug-related forms of delinquency. He also concluded from panel analyses that involvement in drugs short of addiction did not seem to increase such delinquency; in other words, the use of drugs appeared to be simply another (perhaps age-graded) manifestation of a more general deviant behavioral pattern.<sup>5</sup>

Osgood et al. (1988) again demonstrated, using panel data from national samples in the MTF study, that drug use is strongly inter-correlated with non-drug-related forms of deviance, including specific criminal behaviors and dangerous driving. They concluded,

A relatively stable general involvement in deviance accounted for virtually all association between different types of deviance, but the stability of each behavior could only be explained by equally important and stable specific influences. Thus, theories that treat different deviant behaviors as alternative manifestations of a single general tendency can account for some, but far from all, of the meaningful variance in these behaviors. (p. 81)

I believe this is a particularly important finding for the present volume. It means that each individual behavior in the larger domain of risk behaviors, whether defined in terms of deviance or risk taking or sensation seeking (to take the three most commonly used cross-cutting constructs), likely has many specific determinants that do not act on the other behaviors in the domain.

Of course, there very likely *are* a number of common determinants, both intrapersonal and interpersonal (subjects to which I will return later), but there are important behavior-specific determinants, as well. Some of those behavior-specific determinants may have *parallel* determinants for other behaviors, but not necessarily the *same* determinants. The particular example I can offer regards the perceived level of risk associated with engaging in the behavior. Perceived risk of pregnancy may influence sexual behavior just as perceived risk of marijuana use may influence marijuana use, but neither belief may influence the behavior in the other domain. Surely one important goal of this conference is to determine the extent to which the various risk behaviors may have parallel determinants across domains.

Within the general category of potential *parallel determinants*, I might place perceived risk, personal disapproval, perceived peer norms, perceived role model behavior (among public, family, and peer role models), and so on—all specific to the particular behavior in question. Among the *common determinants*, I might put propensity toward deviance (or unconventional behavior), sensation seeking, risk taking, involvement in a deviant peer subgroup, strong family bonds, adjustment and academic success at school, religiosity, and so on. Table 8.3 shows how several of these potential common determinants relate to both the full set of drugs given in Table 8.1 and to two measures of dangerous driving, again using the gamma statistic to measure the degree of association among 12th graders in 2001.<sup>6</sup>

Drug use may be related to a number of other high-risk adolescent behaviors for any of several reasons. Perhaps the most obvious is the one that we have been discussing: These behaviors may all have some common determinants in the intrapersonal or interpersonal spheres. (That they have parallel determinants would not necessarily lead to any intercorrelation among them unless

those parallel determinants—for instance, the degree of danger associated with each—are themselves correlated.)

Another likely source of intercorrelation among many of the risk behaviors may be causal linkages among them. For example, use of many of the drugs discussed here can impair both physical and cognitive performance, as well as judgment, in other domains of behavior. Many psychoactive drugs impair motor and cognitive performance, often with tragic results when combined with driving, swimming, or engaging in some other behavior requiring adept performance or sober judgment. A drunk teen may be less cognizant of his or her performance limitations when under the influence, for example, and insist on driving a car—a judgment he or she may not think wise when sober. Or youngsters high on marijuana or other drugs may decide to have sexual intercourse—which they may not have done had they been sober—and furthermore, they may do so without protection against either pregnancy or STDs. Indeed, the impairment of performance or judgment with regard to some of these other behaviors is one of the risks associated with most kinds of substance use.

There are many known risk and protective factors for the various types of substance use, and I will not try to review that very large literature here. (A review of that literature may be found in Johnston, O'Malley, Schulenberg, & Bachman, 2001, pp. 67-74.) Some of the strongest risk and protective factors are captured in the variables given in Table 8.3; it should be noted that all have to do with the young person's degree of attachment to adult-run institutions traditionally charged with the education and socialization of youth—family, school, and church. The four variables are religiosity, number of days of school cut in the prior four weeks, academic grades, and average number of evenings out of the parental home per week for fun and recreation. (Religiosity is based

Table 8.3 Associations Between Selected Risk Factors and Use of Different Substances (and Dangerous Driving)

|                               | 1. RELIGIOUS<br>COMMITMENT | 2. FREQ. DAYS/<br>4 WK CUT<br>SCHOOL | 3. HS GRADE/<br>D=1 | 4. FREQ./ AV<br>WK GO OUT |
|-------------------------------|----------------------------|--------------------------------------|---------------------|---------------------------|
| 2. FREQ. DAYS/4WK CUT SCHOOL  | -0.16                      |                                      |                     |                           |
| 3. HS GRADE/D=1               | 0.11                       | -0.22                                |                     |                           |
| 4. FREQ./AV WK GO OUT         | -0.07                      | 0.24                                 | -0.06               |                           |
| 5. FREQ. CIGS SMKD/30 DAY     | -0.22                      | 0.31                                 | -0.24               | 0.31                      |
| 6. FREQ. DRNK/ 30 DAY         | -0.23                      | 0.38                                 | -0.13               | 0.35                      |
| 7. 5+DRNK ROW/LST 2WK         | -0.23                      | 0.41                                 | -0.17               | 0.39                      |
| 8. FREQ. MARIJ/ 12 MO         | -0.28                      | 0.40                                 | -0.23               | 0.34                      |
| 9. FREQ. LSD/ 12 MO           | -0.40                      | 0.44                                 | -0.29               | 0.44                      |
| 10. FREQ. OTH PSYD/ 12 MO     | -0.34                      | 0.50                                 | -0.27               | 0.45                      |
| 11. FREQ. COKE/ 12 MO         | -0.29                      | 0.48                                 | -0.31               | 0.47                      |
| 12. FREQ. CRACK/ 12 MO        | -0.30                      | 0.54                                 | -0.38               | 0.52                      |
| 13. FREQ. AMPH/ 12 MO         | -0.23                      | 0.37                                 | -0.25               | 0.35                      |
| 14. FREQ. ICE/ 12 MO          | -0.47                      | 0.41                                 | -0.37               | 0.47                      |
| 15. FREQ. BRBT/ 12 MO         | -0.25                      | 0.40                                 | -0.19               | 0.34                      |
| 16. FREQ. TRQL/ 12 MO         | -0.29                      | 0.45                                 | -0.21               | 0.42                      |
| 17. FREQ. HEROIN/ 12 MO       | -0.28                      | 0.55                                 | -0.27               | 0.46                      |
| 18. FREQ. OTH NARC/ 12 MO     | -0.30                      | 0.44                                 | -0.25               | 0.45                      |
| 19. FREQ. INHAL/ 12 MO        | -0.20                      | 0.37                                 | -0.22               | 0.36                      |
| 20. FREQ. STEROIDS/ 12 MO     | 0.10                       | 0.35                                 | -0.24               | 0.25                      |
| 21. ANY ILLICIT INDEX         | -0.27                      | 0.39                                 | -0.21               | 0.33                      |
| 22. ANY ILLICIT OTHER THAN MJ | -0.31                      | 0.41                                 | -0.21               | 0.37                      |
| 23. FREQ. TICKETS/ 12 MO      | -0.08                      | 0.28                                 | -0.08               | 0.23                      |
| 24. FREQ. ACCIDENTS/12 MO     | -0.06                      | 0.16                                 | -0.05               | 0.16                      |

on the mean of two variables—frequency of church attendance and rated importance of religion in the respondent's life.) There has proven to be a considerable robustness across time in these and many other risk and protective factors, as is documented for a 21-year period in Brown, Schulenberg, Bachman, O'Malley, and Johnston (2001).

#### THE ROLE OF RISK PERCEPTIONS

For the remainder of this chapter, I would like to focus primarily on what we have learned about the nature and role of risk perception in determining substance-using behaviors, while taking advantage of some of the long-term data we have from the MTF study. The 27-year period that the study now spans provides a number of instances of inflections

in perceived risk related to the various drugs and in the use of the substances themselves. It also encompasses a number of historical events that may be linked to some of the changes we have seen. I will begin, however, by listing several findings about this domain of behavior that help to set the stage for this discussion.

#### *Substance-Using Behaviors Have Proven to be Quite Malleable*

Nearly all substance-using behaviors have changed substantially over time in their prevalence and frequency levels, more so than a number of other risky behaviors such as delinquency, for example (Johnston, O'Malley, & Bachman, 2001). These changes suggest that the behaviors can be, and have been, influenced substantially by

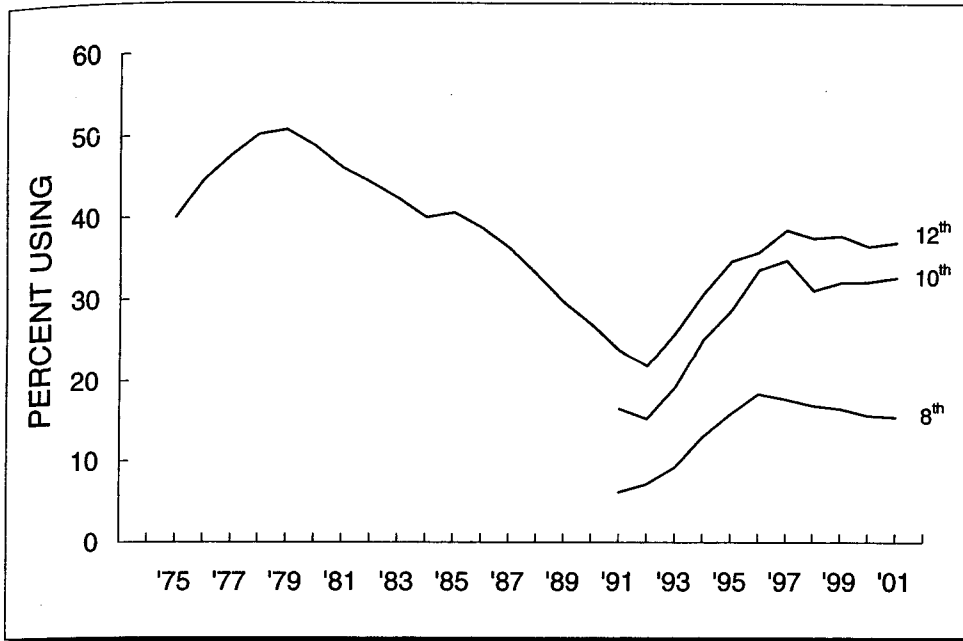


Figure 8.1 Trends in Annual Prevalence of Marijuana: Three Populations

social influences. I emphasize this point because one often hears, particularly by critics of the nation's strategy for dealing with drug use, that the war on drugs has been lost. That conclusion can lead to a sense of impotence in dealing with the drug problem(s) that is simply not justified, whatever the merits of the particular policies in place at any given time. Very appreciable progress in reducing youth substance use has been made in certain historical periods, which means that it could be made again.

Figures 8.1 and 8.2 show the trend lines over the past quarter century for marijuana, by far the most prevalent of the illicit drugs, and for an index of use of any of the other illicit drugs, regardless of specific type. Both measures have shown very considerable variation over the decades. Variability is even greater when looked at by individual substance, which relates to the next point.

### *Trends and Influences Have Been, to a Considerable Degree, Drug Specific*

The index of using any of the illicit drugs other than marijuana might be thought of as measuring the proportion of the youth population willing to entertain the idea of violating general social norms regarding illicit drug use beyond the use of marijuana. Although there is considerable cross-time variability in this condition, as is illustrated in Figure 8.2, there is far more variability in the use of the specific individual substances that make up the index. See Figures 8.3 and 8.4 for some concrete examples of their differing cross-time profiles of use.

This high degree of variability strongly suggests that many of the influences driving these drug-using behaviors are substance specific. I have argued elsewhere that key among these substance-specific factors are (a) young peoples' awareness of the psychoactive potential of the drug, (b) their access to the drug, (c) the alleged

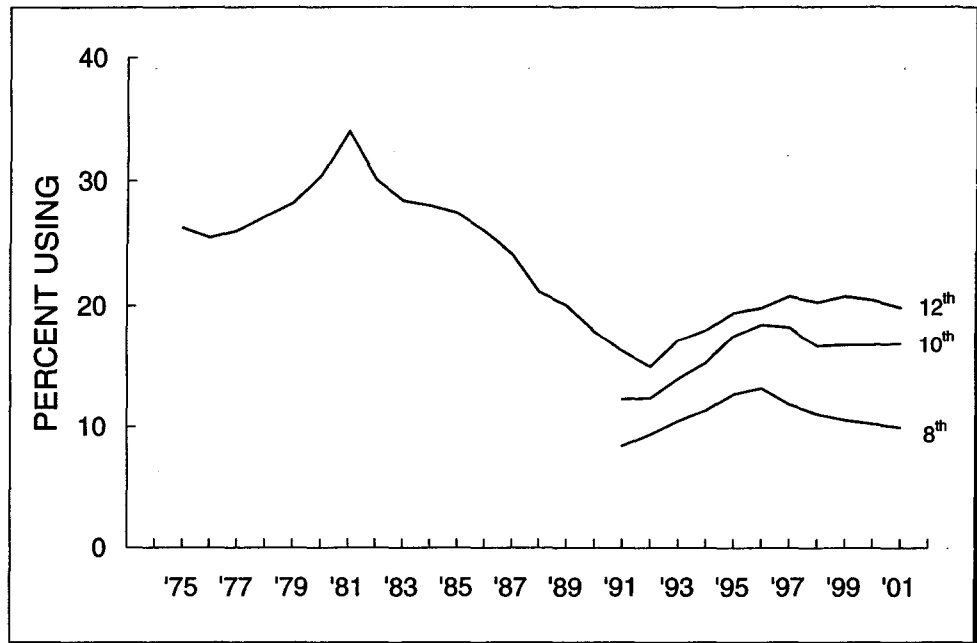


Figure 8.2 Trends in Annual Prevalence of Any Illicit Drug Other Than Marijuana: Three Populations

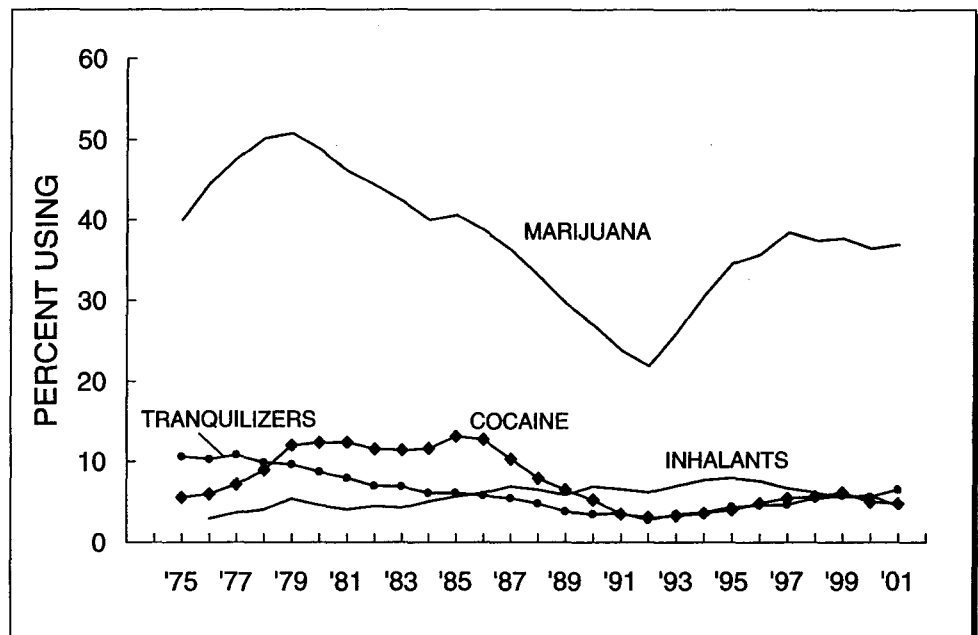


Figure 8.3 Trends in Annual Prevalence of Various Illicit Drugs: 12th Graders

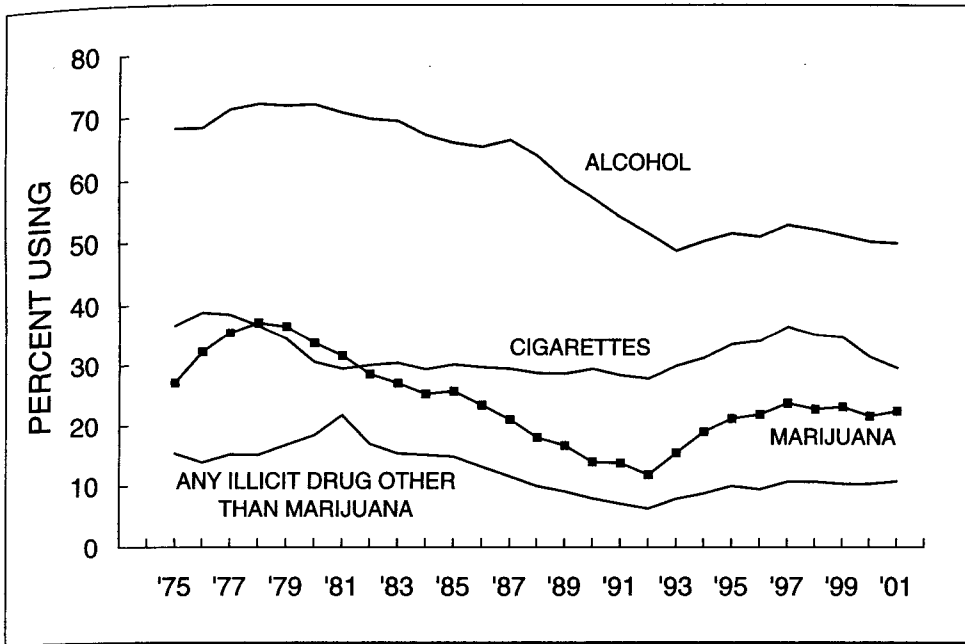


Figure 8.4 Trends in 30-Day Prevalence of Various Drugs: 12th Graders

benefits of use, (d) the degree to which using the drug is seen as deviant both in the larger society and the peer group, and (e) the perceived risks of use (Johnston, 1991b). Awareness, access, and alleged benefits (a very broad category) can all be seen as factors encouraging use, whereas social norms and perceived risk can be seen as controlling factors. (Remember, I am attempting here to distinguish among drugs in their population trends. Obviously, many other such factors contribute to the individual's susceptibility or risk proneness.)

#### *Changes in Both Initiation and Quitting Rates Have Been Associated With Changes in Perceived Risk*

My colleagues and I have written for some time about the association between perceived risk and the use of various drugs. We have tried to demonstrate that trends in perceived risk have played an important role in the decline of marijuana use in the

1980s (Bachman et al., 1988; Johnston, 1991a; Johnston, O'Malley, & Bachman, 2001, and prior volumes in that series), the decline of cocaine use in the late 1980s (Bachman, Johnston, & O'Malley, 1990; Johnston, O'Malley, & Bachman, 2001, and prior volumes), and the increases in marijuana use in the 1990s (Bachman et al., 1998; Johnston, O'Malley, & Bachman, 2001, and prior volumes).

In fact, there are many examples of covariation across time between the use of a drug and perceived risk of its use, as measured by the proportion of respondents who see great risk of harm to the user (associated with experimental, occasional, or regular use). Indeed, in a number of cases, shifts in perceived risk have preceded inflections in actual use by a year, helping to address the concern that they may both be just different sides of the same coin. These relationships may be seen most easily in our annual overview document (Johnston, O'Malley, & Bachman, 2002). However, for illustration

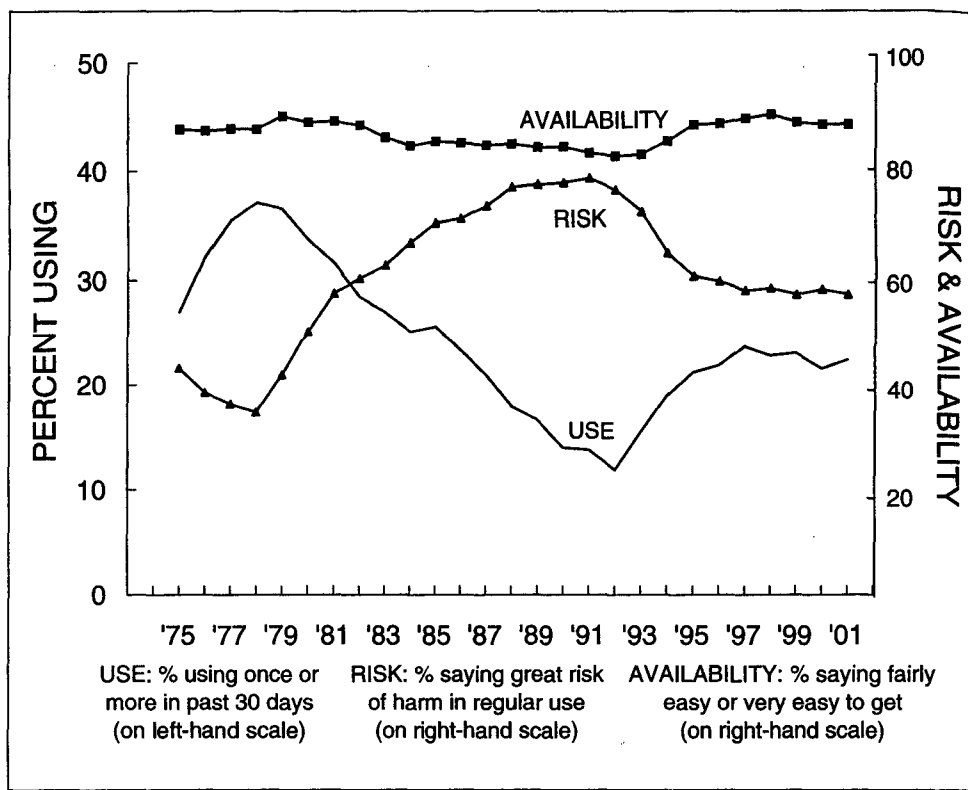


Figure 8.5 Marijuana: Trends in Perceived Availability, Perceived Risk of Regular Use, and Prevalence of Use in Past 30 Days for 12th Graders

purposes, I will focus here on just a few relationships that make the point.

Marijuana use and risk are charted, along with availability, in Figure 8.5, and a similar chart is shown for cocaine in Figure 8.6. The marijuana figure shows that use moved inversely with perceived risk over the 25-year interval, and in fact, perceived risk started to drop in 1991, a year before use started to increase. Other instances of perceived risk being a leading indicator of change in use have also been reported for crack, amphetamines, and heroin (Johnston et al., 2002).

Cocaine offers another interesting example of the role of perceived risk in influencing drug use. Figure 8.6 shows the strong inverse covariance across time between use

and perceived risk of experimental use. The most noteworthy interval in the 25-year span is the period following 1986. That was the year that Len Bias, a first-round draft pick in the NBA, died of what was initially reported to be his first experience with cocaine. That year, an alarmist concern regarding crack reached a crescendo in the media and among elected officials. It is clear from Figure 8.6 that there was a very sharp increase in the perceived risk of cocaine by 1987, and associated with it was the beginning of what became a dramatic drop over the next few years in the prevalence of use among 12th graders. (Use declined by roughly 75%.)

Figure 8.7 presents somewhat more detailed information on the perceived risk of

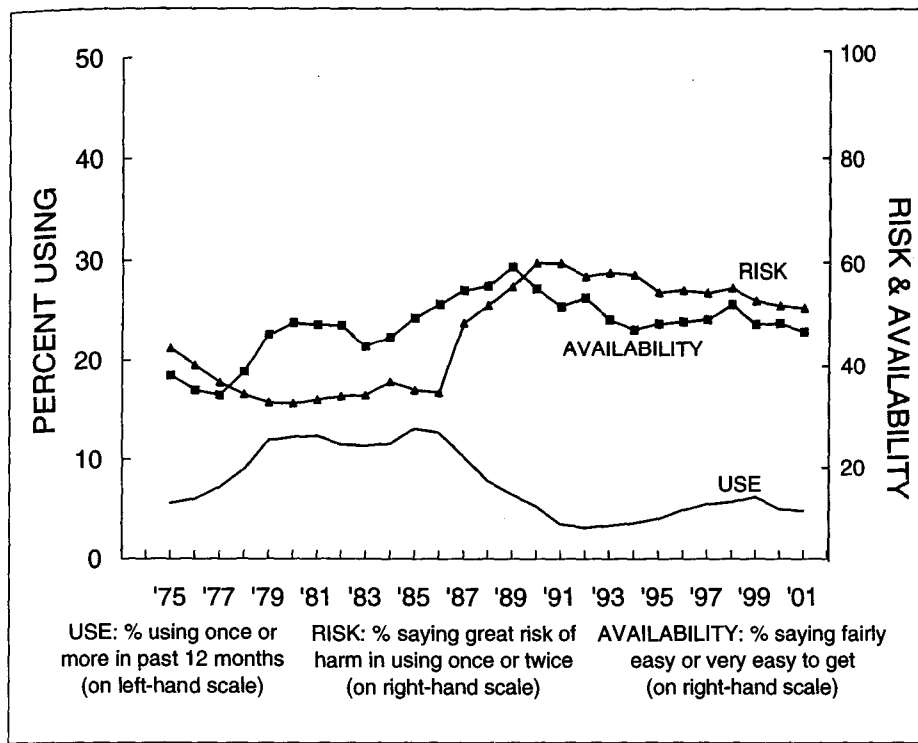


Figure 8.6 Cocaine: Trends in Perceived Availability, Perceived Risk of Trying, and Prevalence of Use in Past Year for 12th Graders

cocaine. It shows trends separately for the proportions saying that there is “great risk” involved in experimental use, occasional use, and regular use. The figure reveals an upward drift in the early 1980s in the proportion of high school seniors seeing great risk in regular cocaine use (but not in experimental use). The fact that use was not moving as expected in the presence of an increase in perceived risk surprised us and led us to the hypothesis that it is the risk associated with the type of use that seniors contemplate for themselves that matters. Given rather long lag time on average between the times people first use cocaine and become regular users, it seemed likely that young people viewed themselves as likely to be light or, at most, occasional users.

That hypothesis prompted us to add the question on perceived risk of occasional use to the 1986 survey—and none too soon, because that measure moved up sharply the year after it was introduced. And the hypothesis was confirmed, insofar as use finally began to drop when occasional and experimental use came to be seen as more dangerous. It seems likely that the Len Bias episode played an important role in modifying these beliefs, because he was, after all, a young person in peak physical condition who apparently was struck down by his first experience with cocaine. (It was revealed only later that this had not been his first encounter with the drug, an account that did not play nearly as widely as the original story.)

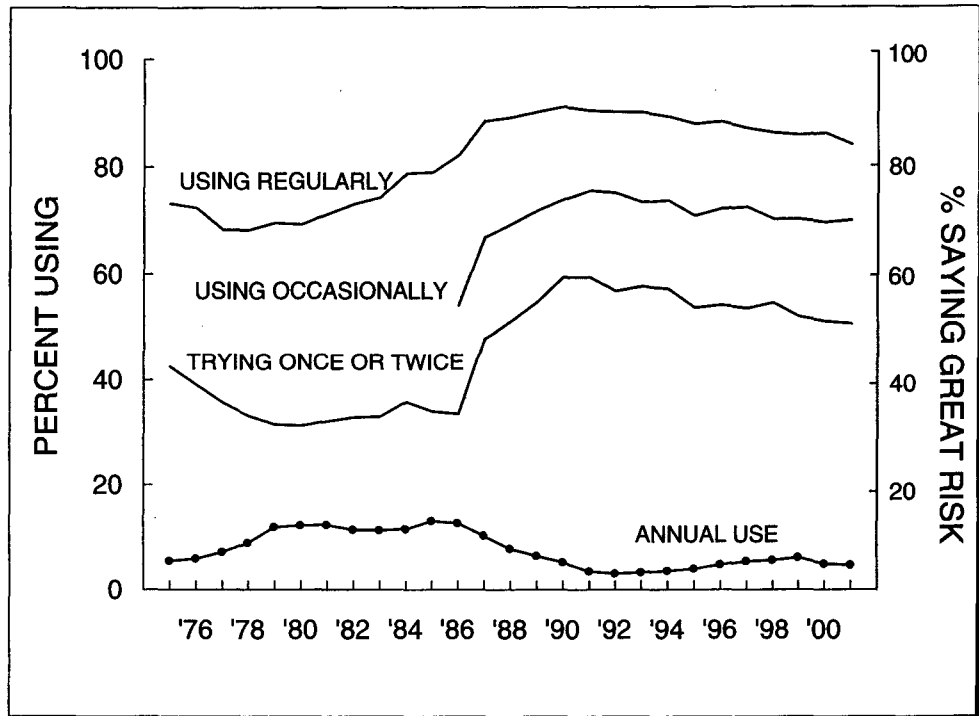


Figure 8.7 Cocaine: Trends in Annual Prevalence and in Perceived Risk of Different Levels of Use

There are two other points to consider on the cocaine story. Crack cocaine was coming onto the scene roughly from 1983 through 1986, and it very rapidly got a reputation—widely reported in the media—as an extremely addictive and dangerous drug. I think it very likely that this rapid negative assessment of the drug kept the prevalence rate of crack cocaine low. Its annual prevalence among high school seniors in 1996 (almost surely the peak year) was only 4.1%, and that statistic fell steadily to 1.5% by 1991.

I also think it likely that, because of the similarities between the two drugs, crack's bad reputation rubbed off on another smokable crystalline stimulant drug that emerged just a few years later—namely, crystal methamphetamine or “ice.” The annual prevalence for ice among high school seniors stayed between 1.3% when it was first measured in 1990 and

1.8% in 1994. After 1994, both ice and crack use began to rise, quite possibly because a newer generation of teens had replaced the earlier one that had “learned” how dangerous these drugs are, and with that generational replacement came what I have termed “generational forgetting” of the dangers of drugs.

The hypothesis I am suggesting is that living through a period when the dangers of a drug (whether valid or not) become widely accepted, influences the individual's belief about those dangers and, to some degree, inoculates him or her against use. Other drugs for which I think this has happened are LSD in the early 1970s and PCP in the late 1970s. LSD came to be seen as dangerous in part because it was widely known that users could have uncontrolled flashbacks, and in part because some scientists alleged that it could cause brain shrinkage and damage

chromosomes. (Both of the latter beliefs were eventually debunked.) PCP, which had an annual prevalence of 7% among high school seniors when we first measured it in 1979, rapidly gained a reputation for causing users to do dangerous and aggressive things, and its use dropped rapidly—to 2.2% within just 3 years. Growing up without learning about those dangers leaves the replacement generation vulnerable to the lures of the very same drugs that fell from popularity in an earlier time period.

To generalize this point, I have hypothesized that a similar learning, and subsequent generational forgetting, of the dangers of HIV may explain the fallback in protective practices among gay men. Whether a similar dynamic might work for other risk behaviors, such as gambling, is less clear to me.

To finish this discussion of the role of perceived risk, let me note that disapproval of a drug usually moves inversely and synchronously with use; in a number of the cases cited above, where perceived risk was a leading indicator of changes in use, it was also a leading indicator of changes in disapproval. Clearly, other factors can influence disapproval, but our hypothesis is that beliefs about a drug's danger level play an important role in influencing personal disapproval and, quite likely, in influencing eventual peer disapproval.

*Changes in Perceived Risk  
and Use Have Been Associated  
With Possible Explanatory Historical  
Events in a Number of Cases*

Deducing causation from time-associated events in history is a dangerous business, of course, but still, a number of time links are worth consideration. My theory of popular drug epidemics suggests that the experiences of role models (particularly among role

model groups favored by teens, such as professional athletes, actors and actresses, and rock musicians) can have a modeling influence on teen behavior, including drug use. Likewise, "unfortunate role models" are those in these same groups who come to a bad end because of their drug use, and they can provide vicarious learning for teens about the dangers of drugs.

Len Bias was such an unfortunate role model, I would contend. Periods of high prevalence of drug use, such as the late 1970s, led to the early deaths of several performers (particularly rock musicians) due to drug use, which may well have contributed to the downturn in the use of most drugs in the 1980s. Another unfortunate role model, with a twist, may have been Lyle Alzado, a professional football player who believed his terminal brain tumor was caused by steroid use and who set out in advance of his death to get that word out to young people. In an MTF occasional paper written in 1991 (and published 2 years later), we predicted that his actions may well influence young people's views about the dangers of steroids (Johnston, O'Malley, Bachman, & Schulenberg, 1993), and the 1992 survey data showed a highly significant 5-percent-age-point jump in perceived risk for steroids in all three grade levels surveyed. (Use fell some that year among 12th graders, but not among 8th and 10th graders.)

Mark McGwire may well have been an unintentional role model for steroid use in 1998, the year he hit his home run record, when it became known through the press that he had been using androstenedione, a legal over-the-counter steroid precursor. In the 1999 MTF survey, we saw a sharp increase in reported steroid use among 8th and 10th graders and a highly significant 6-percentage-point drop in perceived risk for trying steroids among 12th graders (the only ones being asked the risk questions).<sup>7</sup>

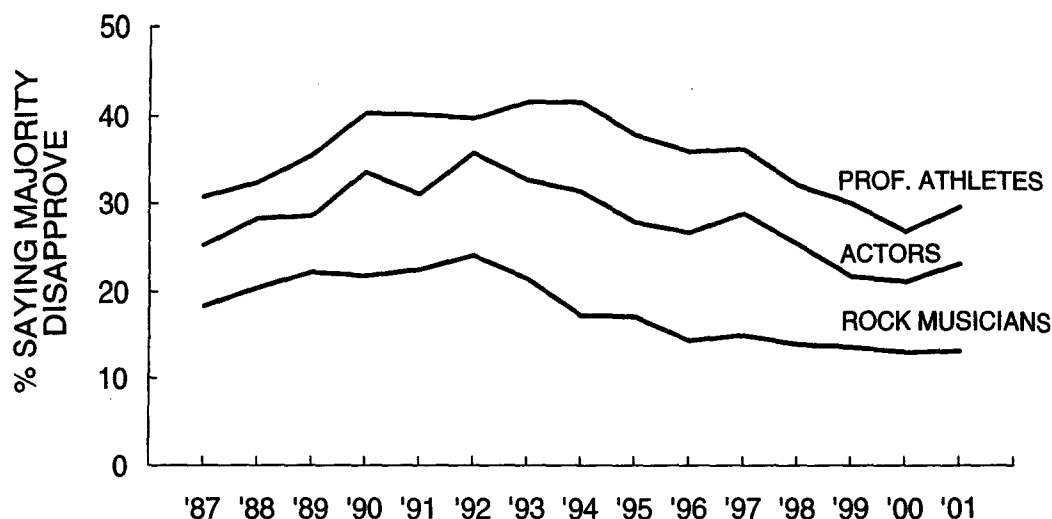


Figure 8.8 Percentage Who Think a Majority of Each Role Model Group Strongly Disapproves of Drug Use: 12th Graders

Role modeling may well have played a role in drug use increase in the early to mid-1990s. Using a set of questions about the students' perceptions of several role model groups (athletes, actors, and rock musicians), we found that during that historical period, there was an increase in the proportions of who thought that these groups used drugs themselves and students approved of their use (see Figure 8.8).

One other historical connection worthy of particular mention deals with the intentional use of advertising to change perceptions of risk. After watching inhalant use rise for nearly two decades, I urged the Partnership for a Drug-Free America to consider a campaign dealing with that class of drugs. They did so, launching their campaign in 1995. In the 1996 MTF survey, there was a 5- to 6-percentage-point increase in perceived risk of trying inhalants in the two grades in

which it was measured (8th and 10th). A turnaround in inhalant use began in 1996 (a year in which practically no other drug was trending down), and it continued at least through 2001. Coincidence? Perhaps, but little else happened during that period that would seem to offer alternative explanation relevant to inhalants.

Ecstasy may provide the next case to test the theory. I have said previously that ecstasy use won't turn around until young people come to see it as dangerous. There is evidence that such a change began to occur in 2001, as perceived risk for ecstasy jumped and the rate of increase slowed (Johnston et al., 2002). We think that an outright turnaround has not yet begun, in part because the drug is still diffusing to communities in which it was not previously available. But as saturation occurs and perceived risk continues to grow (a new

media campaign dealing with ecstasy is now underway), I predict that we will see a turnaround in the use of that drug as well.<sup>8</sup>

In fact, I have attempted in my public statements and writings (e.g., Johnston, 1991b) to convey the notion that a natural corrective cycle applies to almost any drug that has come along and that is likely to come along. Because at first the dangers of the drug go unrecognized and only its alleged benefits are touted, young people are naive and begin to use it. Only when the adverse consequences become painfully obvious do young people become convinced that they should avoid that drug. One strategy for public health education could be to

help young people generalize from the past—to help them realize that virtually all new drugs are likely to have adverse consequences—and help them avoid learning the hard way what those consequences are. In other words, promote among young people a more generalized risk perception or belief about psychoactive drugs. I use cocaine as an example from the past (in the early years of the cocaine epidemic, even the experts did not think it was addictive or deadly) and ecstasy as an example in the present, for which the cycle is still playing out. It is not an easy prevention message to sell, but I believe it holds the kernel of a promising idea.

## NOTES

1. For the purposes of this conference, one of the licit drugs (tobacco) is being treated separately, as well, but I will include tobacco use here in talking about the larger domain of which it clearly is a part.

2. Most cells are based on about 12,500 cases, although a few drugs are contained on only a subset of the six questionnaire forms, yielding smaller *N*s. All cells are based on at least 3,500 cases, however, with only one exception—that between steroids and ice, which has 1,750 cases.

3. Steroid use is contained in only two questionnaire forms (3,600 respondents). Even then, the only correlation involving steroid use that was not found to be significant at the .05 level was that between steroids and ice. It is based on the fewest cases of any cell, although it still had a gamma of .41.

4. Table 8.2 contains data from a single questionnaire form, resulting in an *N* of about 2,000 cases. Questions are asked about the use of over-the-counter stay-awake pills (such as No-Doz, Vivarin, Wake, and Caffediine), diet pills (such as Dietac, Dexatrim, and Prolamine), and the look-alike/sound-alike stimulants (nonprescription—often mail-order drugs—described at some length in the actual question).

5. He also showed that quite a different syndrome of attitudes and behaviors that defined an ideologically alienated subculture at the time—the “counterculture”—was also related to the use of a subset of the drugs, but it was not correlated with delinquency. I do not pursue that finding further here, because it does not seem central to the issues before the conference, except insofar as it illustrates that drug use can be an integral part of a more general lifestyle that may involve other high-risk behaviors.

6. Here again the Pearson product-moment correlations (not shown) were nearly all highly significant ( $p < .0001$ ), with the exception of some cells for

steroid use. For steroids, only the correlations with cutting school and evenings out were significant.

7. Perceived risk fell another 4 percentage points the next year.

8. Since the conference and the writing of the draft for this chapter, the 2002 MTF results have become available, and ecstasy use declined in all three grades, as perceived risk continued to increase sharply.

# REDUCING ADOLESCENT RISK

TOWARD AN INTEGRATED  
APPROACH

DANIEL ROMER, EDITOR  
Annenberg Public Policy Center,  
University of Pennsylvania

 **SAGE Publications**  
*International Educational and Professional Publisher*  
Thousand Oaks ■ London ■ New Delhi

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Sage Publications Ltd.  
6 Bonhill Street  
London EC2A 4PU  
United Kingdom

Sage Publications India Pvt. Ltd.  
B-42, Panchsheel Enclave  
Post Box 4109  
New Delhi 110 017 India

Printed in the United States of America

**Library of Congress Cataloging-in-Publication Data**

Reducing adolescent risk: Toward an integrated approach /  
Daniel Romer, editor.

p. cm.

Papers presented at a conference held at the Adolescent Risk Communication  
Institute of the University of Pennsylvania Annenberg Public Policy  
Center in June 2002.

Includes bibliographical references and index.

ISBN 0-7619-2835-9 (hc) ISBN 0-7619-2836-7 (pb)

1. Risk-taking (Psychology) in adolescence—Prevention—Congresses.

I. Romer, Daniel, 1946-RJ506.R57R43 2003

613'.0433—dc21

2003002701

This book is printed on acid-free paper.

03 04 05 06 10 9 8 7 6 5 4 3 2 1

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*Acquisitions Editor:* James Brace-Thompson  
*Editorial Assistant:* Karen Ehrmann  
*Copy Editor:* Linda Gray  
*Production Editor:* Denise Santoyo  
*Typesetter:* C&M Digitals (P) Ltd.  
*Indexer:* Pamela Van Huss  
*Cover Designer:* Sandy Sauvajot

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with drug abuse prevention, including a laboratory study of need for sensation and need for cognition in a drug abuse prevention context. Her primary areas of interest are in interpersonal communication and in health communication.

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