Preventing the Onset and Developmental Progression of Adolescent Drug Use

Implications for the Gateway Hypothesis

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Efforts to combat the problem of drug abuse have involved a combination of strategies including education, treatment, law enforcement, and mass media campaigns. Among these, approaches intended to prevent the onset and developmental progression of drug use among adolescents have received considerable attention in recent years. A particularly fruitful area of research has involved the development and testing of schoolbased prevention approaches targeting youth during the early adolescent years. This research has demonstrated that at least some approaches to drug abuse prevention can produce substantial reductions in the incidence and prevalence of adolescent drug use. Moreover, this research clearly indicates that ongoing intervention during junior high school can result in durable prevention effects that last at least until the end of high school. Finally, the effectiveness of school-based prevention approaches has been demonstrated for a relatively broad range of students including White, suburban youth, and inner-city minority youth.

A necessary precondition for the development of effective prevention approaches is an understanding of both the causes of drug use and its developmental progression. Together they provide essential information concerning the nature and timing of preventive interventions. Research delineating the etiologic determinants of adolescent drug use has highlighted the importance of an array of interpersonal and intrapersonal factors for promoting and sustaining drug use and has provided guidance to program developers concerning the appropriate focus of preventive interventions. The growing body of etiologic evidence deriving from longitudinal research has led to a realignment of prevention objectives, away from an emphasis on knowledge concerning the adverse consequences of

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drug use and toward a focus on social and psychological factors. Similarly, research concerning the developmental progression of drug use indicates that it proceeds from the use of legal and widely available substances to the use of illegal substances. As a consequence, prevention approaches have generally targeted the use of tobacco and alcohol, two substances whose use is identified as occurring at the beginning of this progression. An implicit assumption of contemporary prevention approaches is that if they are successful, they will not only reduce the initiation of drug use but will also disrupt its developmental progression.

The purpose of this chapter is to summarize nearly two decades of research with a school-based approach to drug abuse prevention called *Life Skills Training* (LST) and examine the extent to which it not only prevents drug use but disrupts its developmental progression. Within the context of a broader discussion of the impact of this prevention approach on the initiation and developmental progression of drug use, special attention is given to the implications of this research for the Gateway Hypothesis. The chapter begins with a discussion of perspectives on the developmental progression of adolescent drug use, describes the LST prevention approach with respect to its impact on the initiation and developmental progression of drug use, and ends with implications for the Gateway Hypothesis and future prevention efforts.

Perspectives on the Developmental Progression of Drug Use

Progression as a Multidimensional Process

The initiation and early stages of drug use typically occur at the beginning of adolescence, escalating from the onset of drug-taking behavior to progressively more serious involvement with drugs. However, whereas the general developmental trajectory of drug use is relatively well understood, what appears to be a simple progression from nonuse to use of one or more substances is more complex than is readily apparent. One source of this complexity is that the developmental course of adolescent drug use is multidimensional. These dimensions include the frequency of drug use, consumption or amount of a drug or drugs used per drugtaking occasion, use of single versus multiple substances, use of licit versus illicit drugs, and use of specific drugs or classes of drugs.

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Kandel, Cambridge University Press, 2002. ProQuest Ebook Central, http://ebookcentral.proquest.com/lib/uncg/detail.action?docID= Created from uncg on 2020-08-03 16:29:43. *Frequency and Amount.* Frequency of drug use progresses from nonuse to initial use, to occasional (annual or monthly) use, and to more frequent (weekly and daily) patterns of use along with an escalation of the amount used. The amount of a given drug used on each drug-taking occasion escalates along a continuum ranging from light to heavy use. With dependency-producing drugs, this escalation in both the frequency and amount of use typically eventuates in the development of tolerance (as larger and/or more frequent administrations of the drug are required to produce the same psychoactive effect) and in both physical and psychological dependence.

Single Versus Multiple Substances. Another way in which drug use can develop is through progression from the use of a single substance to the use of two or more substances. Individuals typically start with the use of a single substance. As frequency and amount of drug use escalate, the likelihood increases that they will proceed to use a second or a third substance.

Licit Versus Illicit Substances. Drug use also tends to progress from the use of legal substances to the use of illegal substances. For example, individuals may progress from the use of substances that are legal for adults (tobacco and/or alcohol) to the use of substances that are illegal (marijuana, cocaine, heroin, hallucinogens, and so on).

Substance-Specific Progression. The other way the sequence of drug use appears to progress is in terms of the type of drug or drugs used. The notion that the development of drug-taking behavior involves progression through a series of stages based on the use of specific substances has been a source of controversy for many years. Still, it is based on empirical evidence indicating that for most individuals alcohol and tobacco are the first substances used. Because of their availability, inhalants may also be among the first used. Individuals may later progress to the use of marijuana.

The use of tobacco, alcohol, inhalants, and marijuana provides adolescents with an introduction to the world of drugs. For some individuals, the use of these drugs may lead to the use of stimulants, opiates, hallucinogens, cocaine, and other illicit drugs. The probability of using any substance in this developmental progression increases significantly with the use of one or more drugs earlier in the progression. The use of tobacco, alcohol, and inhalants significantly increases the risk of use of

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marijuana, and the use of marijuana significantly increases the risk of use of illicit drugs other than marijuana. The Gateway Hypothesis and the evidence supporting it are discussed more fully in the following section as well as throughout this volume.

Stage Sequence for Specific Substances: The Gateway Hypothesis

Models of the developmental progression of drug use invariably suggest that early-stage drug use begins with alcohol and progresses to more involved and varied use of other drugs (e.g., cigarettes, marijuana, and other illicit drugs). Over 20 years of longitudinal research suggests that a succession of developmental stages ordered in a progressive sequence characterizes the earliest stages of drug involvement (Kandel, 1975; Kandel & Faust, 1975; Kandel, Treiman, Faust, & Single, 1976; Single, Kandel, & Faust, 1974). On the basis of findings obtained from crosssectional and longitudinal studies of high school students, Kandel and colleagues outlined a specific developmental sequence that begins with alcohol (beer and wine), followed by cigarettes or hard liquor, marijuana, then other illicit drugs, including pills, heroin, cocaine, and hallucinogens.

The underlying notion that early-stage drug use proceeds in a stagelike manner has been important to both etiologic knowledge as well as prevention science. From a prevention standpoint, there are many benefits to knowing that patterns of early-stage adolescent drug use follow a fairly invariant pathway. First, if efficacious prevention efforts can be targeted to one or more of the drugs that are involved in the early-onset years, a potential benefit of these efforts is to reduce the likelihood of advancing or progressing to more involved and deleterious stages of drug use. Not only are there anticipated health benefits that result from achieving significant reductions in youthful cigarette smoking, for example, but there also may be substantial gains both to society and to the individual if prevention efforts can reduce the likelihood that early-onset cigarette smokers will advance to marijuana or other illicit drug use.

In addition, knowledge that the early stages of drug use proceeds in an orderly stepwise fashion can help focus prevention efforts to identify and ameliorate those risk factors associated with the earliest exposure to the Gateway substances and increase the probability of reducing vulnerability to later and more deleterious substances, such as heroin. Changing certain behaviors at one stage can avert later, more advanced, and possibly more harmful behaviors.

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Evidence for a Developmental Sequence

Despite a wealth of information based on epidemiologic and etiological studies (see review by Kandel & Yamaguchi, 1999), only a handful of studies have applied tests of stage theory within a prevention framework (Collins, Graham, Rousculp, & Hansen, 1997; Collins et al., 1994; Graham, Collins, Wugalter, Chung, & Hansen, 1991). Graham et al. (1991), for example, examined one-year prevention effects on transitions between latent statuses of drug use including cigarettes, alcohol, and marijuana. Latent transition analysis (LTA) showed that a normative education intervention designed to modify perceptions regarding the prevalence and social acceptability of drug use by peers and adults was effective in reducing the probability of moving from a lower-ranked class of drug use (e.g., alcohol) to a higher-ranked class (e.g., alcohol and tobacco). Examination of transitional probabilities showed that students exposed to the intervention were more likely to remain nonusers in the eighth grade than the untreated control group. Among those reporting some use of alcohol at the outset of the study, treated youth were more likely to remain in this status than control youth, who were more likely to transition to more involved drug use (alcohol and tobacco).

In summary, prior research has helped develop a growing understanding of the early stages of drug use. Alcohol is known to play a key role in promoting further and more varied drug use; however, several studies also have highlighted the role of cigarettes and problem alcohol use (e.g., binge drinking and drunkenness) as key risk factors in promoting the transition to problem drug (including marijuana) use. Information from these and related studies has helped to shape primary prevention efforts and may be largely responsible for the emphasis of many current prevention programs on reducing Gateway drug use. However, there is a paucity of research from prevention studies examining the validity of the Gateway Hypothesis. One reason for this is that most prevention programs target multiple drugs, making it difficult to determine whether preventing the use of one drug necessarily deters progression to others.

Approaches for Preventing Onset and Developmental Progression

Focus of Prevention Efforts

According to the Gateway Hypothesis, any level of drug use (even trying a drug just once) can increase the risk of developing drug-related

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Kandel, Cambridge University Press, 2002. ProQuest Ebook Central, http://ebookcentral.proquest.com/lib/uncg/detail.action?docID= Created from uncg on 2020-08-03 16:29:43. problems. From this perspective, occasional drug use is a risk factor for drug abuse and other drug-related problems. For this reason, drug abuse prevention programs targeting youth have focused on preventing the early stages of drug involvement as a method of reducing drug abuse risk. For middle or junior high school students, this might involve attempting to prevent onset or occasional (annual or monthly) use. For high school students, it might involve attempting to deter more serious levels of drug involvement (e.g., weekly or daily use of a single drug, use of multiple drugs, or "heavy" use) as well as preventing drug-related problems such as accidents or violence.

More specifically related to the Gateway Hypothesis is the notion that use of drugs that are legal for adults (tobacco and alcohol) and/or use of marijuana will eventuate in the use of illicit drugs such as heroin and cocaine. Although this is often used as the rationale for focusing on the prevention of tobacco, alcohol, and marijuana, prevention studies have generally not addressed the crucial issue of whether preventing Gateway drug use is an effective strategy for preventing the use of illicit drugs other than marijuana.

Both because mortality and morbidity are associated with tobacco and alcohol and because the use of marijuana increases the risk of using other illicit substances, drug abuse prevention programs have usually focused primarily on preventing the use of tobacco, alcohol, and marijuana. Moreover, because there is a direct relationship between the age of onset and the subsequent development of serious drug-related problems, prevention programs are likely to be valuable even if they merely delay drug use initiation or prevent the transition from occasional use to more serious levels of drug involvement.

Approaches to Prevention

Over the past 20 years, considerable attention has been given to the identification and testing of intervention approaches offering the potential of preventing the initiation and early stages of drug use. A variety of approaches have been tested, including public information campaigns, school-based approaches, family interventions, and community-based prevention approaches. Perusal of the growing prevention literature indicates that most prevention research has been conducted with approaches designed to be implemented in school settings. One reason is that schools are a natural site for implementing and testing prevention programs targeting children and adolescents. Schools not only provide

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easy access to the appropriate target populations for these interventions, but also offer the kind of well-structured setting that is necessary for conducting rigorous evaluation research. This research has proceeded from small-scale pilot studies assessing the feasibility, acceptability, and preliminary efficacy of promising prevention approaches to large-scale randomized, controlled trials.

Early efforts to develop effective prevention approaches were generally based on the assumption that individuals who used drugs did so largely because they were unaware of the deleterious effects of drug abuse (Goodstadt, 1986). It was therefore assumed that providing information about the dangers of drug use would serve as an effective deterrent. Unfortunately, countless literature reviews have highlighted the ineffectiveness of such approaches to prevention (e.g., Botvin, 1999; Botvin & Botvin, 1992; Schinke, Botvin, & Orlandi, 1991).

As etiologic evidence has emerged, it has become increasingly clear that there is no single factor or single pathway that serves as a necessary and sufficient condition leading to drug abuse. Rather, drug abuse is the result of a multivariate mix of factors (Hawkins, Catalano, & Miller, 1992; Newcomb & Bentler, 1989). Some of these etiologic factors increase risk for drug involvement, whereas other (protective) factors decrease the potential for involvement. Conceptualized very broadly, the process of becoming a drug abuser involves the dynamic interaction of an individual and his or her environment. Social influences to use drugs (along with the availability of drugs) interact with individual vulnerability. The media portrayal of drug use (TV shows and movies glamorizing drug use or suggesting that drug use is normal or socially acceptable, as well as advertising efforts promoting the sale of alcohol and tobacco products) plays a major role in promoting drug use. Another important social influence is that of family members who either use drugs or express pro-drug-use attitudes and/or of friends and acquaintances who use drugs or hold attitudes and beliefs supportive of drug use. Some individuals may succumb to peer pressure to use drugs because of intrapersonal factors such as low self-esteem, high anxiety, hopelessness, low personal control, or the need for excitement (i.e., sensation seeking). Moreover, the accumulation of risk factors increases the risk of using and eventually abusing drugs. The greater the number of risk factors, the more likely that an individual will become a drug user and eventually a drug abuser since the presence of multiple risk factors is associated with both initial drug use and the severity of later drug involvement (Newcomb & Felix-Ortiz, 1992; Scheier & Newcomb, 1991).

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It therefore seems evident that to be effective, prevention programs must not only take into account the complex array of factors promoting drug use, but also recognize the important role of social factors including influence of friends and family members (Barnes & Welte, 1986; Kandel, 1985: Krosnick & Judd, 1982) and media (Tye, Warner, & Glantz, 1987). Individuals are more likely to use drugs if they view drug use as a normative behavior (Chassin, Presson, Shermon, Corty, & Olshavsky, 1984) or have specific psychological characteristics such as low social confidence, assertiveness, personal control, and self-efficacy (Dielman, Leech, Lorenger, & Horvath, 1984; Jessor & Jessor, 1977; Weir, 1968). It is also important to recognize that drug use is part of a general syndrome or life-style reflecting a particular value orientation and cooccurring with other problem behaviors (Jessor & Jessor, 1982; Newcomb & Bentler, 1986). Prevention approaches that are based on a solid theoretical and empirical foundation, target the broad array of etiologic factors promoting drug use, and take into account the developmental process leading to drug abuse have proved particularly promising.

Life Skills Training

One such approach, called *Life Skills Training* (LST), has been subjected to extensive testing by our group at Cornell University Medical College. This prevention program is an example of a comprehensive, school-based approach to drug abuse prevention that targets an array of etiologic factors. The evidence supporting its effectiveness also indicates how prevention programs can impact drug use at various points along the developmental continuum leading from initial use to more serious levels of drug involvement, including progression from one drug class to another.

The LST program is a drug abuse prevention program that is designed for middle or junior high school students and is intended to be implemented in school classrooms. The program consists of a core curriculum, delivered during the first year of intervention, and a two-year booster curriculum. The program currently consists of 15 class periods in the first year, 10 classes in the second year, and 5 classes in the third year. Except for our initial pilot research, all of the studies evaluating the LST program have been conducted with seventh graders. When booster sessions were included, students received the LST program in the seventh grade and the booster intervention in the eighth and ninth grades. Thus, curriculum materials have now been developed and tested

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Kandel, Cambridge University Press, 2002. ProQuest Ebook Central, http://ebookcentral.proquest.com/lib/uncg/detail.action?docID= Created from uncg on 2020-08-03 16:29:43. for all three years of junior high school. For school districts with a middle school, the LST program can be implemented with students in grades six, seven, and eight.

The LST prevention program consists of three major components: The first is designed to teach students a set of general self-management skills; the second focuses on teaching general social skills; the third includes information and skills that are specifically related to the problem of drug abuse. The first two components are designed to enhance overall personal competence and decrease both the motivations to use drugs and vulnerability to drug use social influences. The problemspecific component is designed to provide students with material relating directly to drug abuse (drug resistance skills, antidrug attitudes, and antidrug norms).

Personal Self-Management Skills. The personal skills component of the LST program is designed to impact an array of self-management skills. To accomplish this, the personal skills component contains material to (1) foster the development of decision making and problem solving (e.g., identifying problem situations, defining goals, generating alternative solutions, considering consequences); (2) teach skills for identifying, analyzing, interpreting, and resisting media influences; (3) provide students with self-control skills for coping with anxiety (e.g., relaxation training) and anger/frustration (inhibiting impulsive reactions, reframing, using self-statements); and (4) provide students with the basic principles of personal behavior change and self-improvement (e.g., goal setting, self-monitoring, self-reinforcement).

Social Skills. The social skills component is designed to impact several important social skills and enhance general social competence. This social skills component contains material designed to help students overcome shyness and improve general interpersonal skills. This material emphasizes the teaching of (1) communication skills, (2) general social skills (e.g., initiation of social interactions, conversational skills, complimenting), (3) skills related to boy/girl relationships, and (4) both verbal and nonverbal assertive skills.

Drug-Related Information and Skills. The drug-related information and skills component is designed to impact knowledge and attitudes concerning drug use, normative expectations, and skills for resisting drug use influences from the media and peers. The material contained in this

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component is similar to that contained in many psychosocial drug abuse prevention programs that focus on the teaching of social resistance skills. Included is material concerning the (1) short- and long-term consequences of drug use; (2) knowledge about the actual levels of drug use among both adults and adolescents in order to correct normative expectations about drug use; (3) information about the declining social acceptability of cigarette smoking and other drug use; (4) information and class exercises demonstrating the immediate physiologic effects of cigarette smoking; (5) material concerning media pressures to smoke, drink, or use drugs; (6) information concerning the techniques used by cigarette and alcoholic beverage advertisers to promote the use of these drugs and skills for resisting them; and (7) techniques for resisting direct peer pressure to smoke, drink, or use drugs.

Effectiveness for Preventing Initiation and Escalation of Drug Use

The primary objective of drug abuse prevention research over the past three decades has been to identify approaches capable of preventing the initiation and/or escalation of drug use and provide evidence of their effectiveness. It has become clear that many prevention approaches are able to increase health knowledge and promote antidrug attitudes, but very few are capable of changing behavior and deterring drug use. It was not until the end of the 1970s and beginning of the 1980s that evidence that some prevention approaches could deter drug use began to emerge (Bangert-Drowns, 1988; Botvin, 1999; Botvin & Botvin, 1992; Hansen, 1992). Since then a growing research literature has documented the efficacy of several promising prevention approaches, including the Life Skills Training program.

During the 1980s and 1990s, our team of researchers at Cornell conducted a series of evaluation studies testing the effectiveness of the Life Skills Training (LST) program. These studies were conducted in a logical sequence to determine the effectiveness of this promising approach with different forms of drug use, when implemented by different program providers, and with different populations. The initial LST research focused on cigarette smoking and involved predominantly White middle-class populations. More recent research extended this work to other forms of drug use including the use of alcohol, marijuana, and illicit drugs other than marijuana. In addition, this research examined the effectiveness of the LST approach when used with inner-city

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minority youth. Finally, this research assessed the long-term durability of the LST prevention model, the impact on hypothesized mediating variables, and the role of implementation fidelity. These studies are briefly described later along with the key findings in order to examine the impact of the LST program on the initiation and developmental progression of drug use.

The primary goal of most studies testing the LST approach was to determine the extent to which it could prevent drug use initiation. In studies in which follow-up data were collected, the impact of the prevention program was also evaluated in terms of measures of more serious drug involvement. Thus, the emphasis of evaluations focusing on the initial impact of the prevention program centered on either lifetime (ever) use or occasional (monthly) use. However, the emphasis usually shifted in studies with intermediate- and/or long-term follow-up to assessment of the impact of the prevention program on regular (weekly or daily) use, "heavy" or problem use, use of multiple drugs, and, in one study, use of illicit drugs other than marijuana.

Preventing Drug Use Initiation

Most drug abuse prevention studies have focused on the capacity of the particular approach to deter drug use initiation. Several studies testing the LST prevention approach indicate that it can significantly reduce the onset of drug use. Studies have shown that the LST approach can reduce the onset of cigarette smoking in the three months between the baseline and the initial posttest when implemented by either project staff or peer leaders. In a study testing the short-term efficacy of the LST program with students (N = 281) in the eighth, ninth, or tenth grades, findings showed that the prevention program reduced new (current) cigarette smoking by 75%, comparing the onset rate for students receiving the LST program (4%) to that of the controls (16%) at the initial posttest (Botvin, Eng, & Williams, 1980) and by 67% (6% vs. 18%) at the three-month follow-up (Botvin & Eng, 1980). A second study (N = 426) tested the effectiveness of this prevention approach when implemented by older peer leaders (Botvin & Eng, 1982). New (current) cigarette smoking was reduced by 58% when the posttest rates for seventh graders receiving the LST program (8%) were compared to those for controls (19%).

Additional studies have examined the impact of the LST prevention program on alcohol and/or marijuana use. The first study to examine

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alcohol use was conducted with seventh graders from two comparable New York City public schools (N = 239) randomly assigned to experimental and control conditions (Botvin, Baker, Renick, Filazzola, & Botvin, 1984). The intervention was modified to include material concerning the potential consequences of alcohol use, and, where appropriate, skills were taught in relation to situations that might promote alcohol use. At the six-month follow-up, significantly fewer (54%) experimental students reported drinking in the past month compared to controls.

A larger study was conducted to replicate the alcohol results and to test the generalizability of the LST approach to marijuana use. The study included 1,311 seventh-grade students from 10 suburban New York junior high schools (Botvin et al., 1984). Results found significant prevention effects for tobacco, alcohol, and marijuana use at the four-month initial posttest. Adolescents who participated in the LST program drank significantly less alcohol per drinking occasion and were drunk less often. The LST program reduced occasional (monthly) marijuana use by 71% and regular (weekly or daily) marijuana use by 83%.

Research also indicates that drug initiation can be prevented with minority youth. For example, several studies with minority youth show that LST can reduce smoking initiation (Botvin, Dusensbury, Baker, James-Ortiz, & Kerner, 1989; Botvin et al., 1992; Botvin et al., 1989) and occasional use of alcohol (Botvin, Schinke, Epstein, & Diaz, 1994). More recently, a large randomized trial involving a predominantly (97%) minority sample of inner-city girls (N = 2,209) from 29 schools found that the LST program significantly reduced lifetime and occasional smoking (Botvin, Griffin, Diaz, Miller, & Ifill-Williams, 1999). Although the effect was significant, the prevention program cut smoking by approximately 30% among inner-city, minority youth rather than the 50% reductions found in studies with White suburban populations.

Preventing Escalation in the Frequency of Use

Evidence also supports the efficacy of school-based prevention programs to prevent escalation in the frequency of use. Research with the LST approach has shown that it is capable of preventing the progression of cigarette smoking from lifetime use to occasional use or from occasional use to regular use. For example, one study indicated that initial prevention effects, assessed in terms of occasional (monthly) smoking during seventh grade, resulted in a 56% reduction in regular (weekly) smoking one year later (Botvin & Eng, 1982). Similarly, a study with 902 seventh

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graders from suburban schools produced significant reductions in the onset of new smoking at the initial posttest for students who received the LST program. Once again, significant prevention effects were found one year later when these students were eighth graders in terms of more regular (weekly and daily) cigarette smoking and again at the 18-month follow-up (Botvin et al., 1983). Moreover, students receiving booster sessions in the eighth grade included half as many regular (weekly or daily) cigarette smokers as those receiving the LST program in the seventh grade. Finally, a study with minority inner-city girls found that this prevention program was able to prevent escalation from lifetime smoking to occasional smoking over a one-year period (Botvin et al., 1999). Thus, these studies show that either with or without booster sessions this prevention program is able to reduce escalation in the frequency of drug use from either lifetime to occasional smoking or occasional smoking to more regular smoking.

Preventing Heavy or Problem Use

Since most prevention programs focus on preventing early stage drug use, relatively few studies have tested the extent to which a prevention program could prevent "heavy" or problem use. Still, there is at least some evidence from research with the LST program that prevention programs can have an impact on heavy or problem use. One study (N = 239) showed substantial reductions in more serious levels of alcohol use: 73% fewer LST students reported heavy drinking (three or more drinks per occasion) and 79% fewer reported getting drunk at least once a month at the six-month follow-up (Botvin, Baker, Botvin, Filazzola, & Millman, 1984). In a study of 1,311 seventh-grade students from 10 suburban New York junior high schools (Botvin et al., 1984), adolescents who participated in the LST program drank significantly less alcohol per drinking occasion and were drunk less often.

Preventing Escalation to Heavy, Multiple, and Illicit Drug Use

Although the studies cited found that the prevention program produced less heavy or problem alcohol use, this finding was not necessarily the result of a disruption in the developmental progression of substance use that began earlier (i.e., that the prevention program first lowered the rate of initiation and/or occasional use of alcohol and that in turn caused

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lower rates of heavy use further along the developmental sequence). Stronger evidence that the prevention program disrupted a hypothetical developmental progression requires longitudinal research with longer follow-up. Such a study was conducted in the late 1980s (Botvin et al., 1990; Botvin et al., 1995).

Results from this six-year randomized trial show that the LST prevention approach can have an impact over time on more serious levels of drug involvement, including use of multiple Gateway drugs and illicit drug use (Botvin et al., 1995). The study began in 1985 and involved nearly 6,000 seventh graders from 56 public schools in suburban and rural New York State. Schools within each of three geographic regions of the state were randomly assigned to one of two experimental conditions (prevention program with training and support by project staff, or prevention program with no project staff involvement) or the control condition. Students in the two prevention conditions received the LST program during the seventh grade (15 sessions) with booster sessions in the eighth grade (10 sessions) and ninth grade (5 sessions). Although some material targeting tobacco, alcohol, and marijuana use was included in the LST program, most of the prevention program focused on teaching generic personal and social skills.

In the first two years of the intervention, at the end of the 7th and 8th grades, there were significant program effects on cigarette smoking and several etiologic factors in a direction consistent with non-drug use. Follow-up data were published after three years (9th grade), six years (12th grade), and 6.5 years (after high school). Long-term prevention effects were found for cigarette smoking, alcohol and marijuana use, regular (monthly or weekly) use of all three Gateway drugs, and illicit drug use other than marijuana use.

More specifically, data assessing the impact of the prevention program at the end of the 9th grade indicated that the prevention program produced significantly less smoking, marijuana use, and problem drinking in the intervention group than among controls. Long-term followup data collected at the end of the 12th grade indicated that there were up to 27% fewer regular smokers, 25% fewer heavy (pack-a-day) smokers, 12% heavy drinkers (three or more drinks of alcohol per occasion), and 44% fewer marijuana users for students who received the LST prevention program during the 7th grade and had booster sessions during the 8th and 9th grades than for controls (Botvin, Baker, Dusenbury, Botvin, & Diaz, 1995).

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Impact on the Use of Multiple Gateway Drugs

In order to assess the impact of the prevention program on more serious levels of drug involvement, the Botvin et al. (1995) study also compared prevention and control students in terms of regular (monthly or weekly) use of tobacco, alcohol, *and* marijuana use. At the end of the 12th grade, there were 44% fewer LST students than controls who used all three Gateway drugs one or more times per month and 66% fewer LST students who reported using all three substances one or more times per week. The strongest prevention effects were produced for the students who received the most complete implementation of the prevention program and whose teachers attended annual training workshops and received ongoing support from project staff.

Preventing Illicit Drug Use

Long-term follow-up results from the large-scale prevention trial discussed previously also provided evidence that the LST prevention program can reduce illicit drug use (Botvin, Griffin, Diaz, Scheier, Williams, & Epstein, in 2000). An underlying assumption of primary prevention efforts is that if they prevent or reduce the use of tobacco, alcohol, and/or marijuana they will have a corresponding impact on the use of other substances further along the developmental progression. In other words, preventing Gateway drug use would be expected to reduce the use of illicit drugs such as cocaine or heroin. However, although this rationale is commonly used to justify targeting Gateway drug use, it has never been directly tested.

The impact of the LST program on illicit drug use was addressed by analyzing data collected from an anonymous subsample of students involved in the long-term follow-up study described. Data were collected by mail from 454 individuals (mean age = 18.86) who were contacted after the end of the 12th grade. The length of follow-up was 6.5 years from the initial baseline. The survey assessed the use of 13 illicit drug categories, following those used by the University of Michigan *Monitoring the Future* study (Johnston, O'Malley, & Bachman, 1994). These categories included marijuana, cocaine, amphetamines, methaqvalone [Quaaludes], barbiturates, tranquilizers, heroin, narcotics other than heroin, inhalants, amyl or butyl nitrites, LSD, phenylcyclohexyl piperidine (PCP), and 3, 4–methylenedioxymethamphetamine (MDMA).

Stages and Pathways of Drug Involvement : Examining the Gateway Hypothesis, edited by Denise B.

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Significantly lower levels of drug involvement (relative to those of controls) were found for the LST students on two composite measures of illicit drug use as well as for specific illicit drug categories. There were lower levels of illicit drug use using the composite measure that assessed any illicit drug use and for the measure that assessed use of illicit drugs other than marijuana. More specifically, there were significantly lower levels of heroin use and hallucinogen use for the students who received the LST program in junior high school. Thus, data from this study indicate that preventing Gateway drug use can reduce the use of some illicit drugs. However, the analyses in this study are based on aggregate data involving the comparison of group means and may not adequately capture the pattern of changes occurring on an individual level. Other analytic methods, such as structural equation modeling (SEM), might be more appropriate for studying patterns of individual changes.

Examining Developmental Transitions

Therefore, Scheier, Botvin, & Griffin (2001) conducted a series of SEM analyses to examine further the impact of the LST approach on developmental transitions in drug use. These analyses were conducted with data from a longitudinal sample of students (N = 2,030) derived from a randomized prevention trial that involved annual assessment from the seventh through the tenth grade. Figure 6.1 presents the analytic framework used to examine the extent to which the intervention disrupted drug use progression and to test the mediational process through which the intervention produced these effects. Figure 6.1 also includes necessary controls for developmental stability and pretest equivalence, two important concerns when using longitudinal data to test program effects.

The SEM models were designed to test one hypothesized mediational mechanism (enhancing assertiveness) through which the LST prevention program may produce any observed effects. The models tested include latent constructs of assertiveness (Assertive Skills) at baseline (7th grade) and one-year follow-up (8th grade) and drug use (Multiple Drug Use) at the end of the 10th grade. Focal measures of assertiveness included assertive behavior (e.g., frequency in returning defective merchandise), assertive efficacy (e.g., perceived assertive mastery), drug refusal skills (frequency of rejecting active offers to use drugs), and drug refusal efficacy (perceived mastery in rejecting drug offers). The assertiveness construct includes important aspects of the prevention program, generic assertiveness, and domain-specific (i.e., drug refusal)

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assertiveness. The Multiple Drug Use latent construct is derived from measures of cigarette, alcohol, and marijuana use.

A major strength of SEM is the ability to detect general program effects and, controlling for these effects, search for program-related effects on specific prevention components. The exact method to examine general and specific effects involves using post hoc specification searches. Briefly, specification searches include positing paths from the program measure to individual program components (e.g., assertive behavior or drug refusal skills). These paths reflect treatment effects on skills controlling for change in assertive competence.

In addition to testing intervention effects, specification of paths from early (pretest) drug use to later use of specific drugs (e.g., alcohol use) provides a means of examining the plausibility of stage sequences and program-related disruption of those sequences. For instance, program effects can promote reductions in multiple drug use (cigarette, alcohol, and marijuana use) as well as reductions in the use of a specific substance (e.g., alcohol only).

In order to test specific stage sequences on the basis of drug type, inclusion criteria for the analyses based on self-reported drug use varied. The far left-hand side of Figure 6.1 shows the inclusion criteria utilized for each model. Model 1 examined developmental progression and intervention effects by using the entire panel sample (students present at pretest and three follow-ups) and included all patterns of drug use. This model provides a test of the intervention on multiple drug use and tests whether early forms of drug use (e.g., alcohol use) influence later progression to increased drug involvement (e.g., alcohol and marijuana use). To illustrate a stage sequential test, a path was specified from alcohol use in the seventh grade to marijuana use in the ninth grade along with a path from marijuana use in the ninth grade to later Multiple Drug Use. This developmental sequence tests directly whether early alcohol use promotes later and more involved drug use through the intermediate stage of marijuana use.

Model 2 included a test of whether early alcohol involvement influences Multiple Drug Use and whether cigarette use represents a necessary intermediate stage. In contrast to Model 1, Model 2 included a pretest latent construct of alcohol involvement reflected by indicators tapping frequency, intensity, and drunkenness. One important difference between Model 1 and Model 2 is the exclusion of pretest smokers in Model 2, which provides a means to test whether cigarette use represents an essential stage between early alcohol and later multiple drug use.

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Model 3 tested whether early smoking behavior (cigarette use) leads to the use of all three Gateway drugs or whether involvement with alcohol represents an essential intermediate step that links smoking behavior with the use of multiple drugs. Specification of this model included a pretest measure of smoking frequency, a latent construct of Alcohol Use in the 9th grade, and a latent construct of Multiple Drug Use in the 10th grade. Model 3 excluded youth reporting pretest alcohol use, thus permitting a test of whether early cigarette use proceeds directly to later multiple drug use or whether alcohol use represents an essential intermediate stage in the drug sequence.

Results from all three models support a stage sequential model of drug use. Specifically, early alcohol use was a determinant of later involvement with multiple drugs. In addition, a small portion of youth initially experimented with alcohol and then progressed directly to marijuana use (manifest indicator). Moreover, findings from Model 2 show that early alcohol involvement led directly to multiple drug use. These findings also show that intense alcohol use (defined by quantity consumed) preceded marijuana use over the course of one year. Results from Model 3 indicate that even with appropriate sample exclusions to eliminate alcohol-using youth, early cigarette use led to alcohol involvement in the 9th grade and multiple drug use in the 10th grade.

In addition to identifying specific facets of developmental progression, the findings also confirm that enhancing assertiveness successfully disrupts the early stages of drug involvement. Regardless of whether these youth drank alcohol or used tobacco as their entry point for drug use, enhancing assertive competence reduced the likelihood of further drug involvement. Reducing risk included limiting alcohol involvement as an intermediate stage as well as further reducing multiple drug use. Across all three models, indirect program effects on assertiveness indicate that for roughly a 10% change in assertiveness, there are corresponding reductions in drug use of 30% to 50%. Thus, a relatively small change in generic assertive skills and drug refusal (assertive) skills over a one-year period (from the seventh to the eighth grade) was responsible for substantial reductions in drug use. Importantly, the impact of the intervention did not vary as a function of drug use reported at baseline. This suggests that targeting assertiveness at this developmental period, regardless of initial drug use status, represents an effective deterrent to later drug involvement.

Taken together, the etiologic and prevention findings of this study underscore the importance of focusing prevention efforts on reducing

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Gateway drug use. These findings indicate that the impact of the LST program was mediated by increasing generic assertive skills, assertive efficacy, and drug refusal skills. Among those youth reporting baseline alcohol use, the LST program reduced the risk of later marijuana use as well as multiple drug use. Among youth reporting baseline smoking behaviors but no alcohol use, improvements in assertiveness reduced the likelihood of experimentation with alcohol use and multiple drug involvement. Moreover, the findings of this study provide additional support for the Gateway Hypothesis.

Summary and Conclusions

Advances in drug abuse prevention research have identified several promising approaches. The results of two decades of research with Life Skills Training, a multicomponent prevention approach, provide strong empirical evident that the program can produce substantial reductions in tobacco, alcohol, and marijuana use; booster sessions can both sustain and enhance initial prevention effects; and the program produces prevention effects that are durable and long-lasting. The findings of this research also indicate that Life Skills Training can disrupt the developmental progression of drug use. This prevention approach can reduce initial cigarette smoking, the transition from occasional to regular use, multiple drug use (cigarettes, alcohol, and marijuana), and use of illicit drugs other than marijuana.

Although the prevention research discussed in this chapter was not designed explicitly to examine the Gateway Hypothesis, this body of research does provide general support for it. The findings from 20 years of research with the LST program indicate that preventing the use of substances hypothesized to occur at the very beginning of the developmental progression (tobacco and alcohol use) not only deters the use of those substances, but also deters the use of marijuana and of at least some illicit drugs other than marijuana. Moreover, a study designed to test one hypothesized mediational mechanism for the LST program as well as to examine the impact of the prevention program on deterring the progression of drug use provides further support for the Gateway Hypothesis. Although variations were identified in terms of progression among Gateway substances, the LST program was able to disrupt the progression of drug use regardless of the developmental sequence. Future prevention efforts should focus on preventing the use of all three Gateway

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drugs both because prevention of Gateway drug use is important to public health and because it is also likely to deter progression to the use of other drugs.

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