

## Life Skills Training: Empirical Findings and Future Directions

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*Alcohol, tobacco, and other drug use are important problems that typically begin during adolescence. Fortunately, substantial progress has been made in developing effective drug abuse prevention programs for youth over the past two decades. The Life Skills Training (LST) program is an effective primary prevention program for adolescent drug abuse that addresses the risk and protective factors associated with drug use initiation and teaches skills related to social resistance and enhancing social and personal competence. This paper provides an overview of the theoretical underpinnings of the LST program, along with a description of the program's core components, materials, and methods. Findings from over two decades of evaluation research are reviewed, including results from a series of small scale efficacy studies and large scale effectiveness trials with a variety of adolescent populations. These studies have demonstrated positive behavioral effects of LST on smoking, alcohol, marijuana use as well as the use of multiple substances and illicit drugs, with prevention effects lasting up until the end of high school. Further research is needed to understand the mediating mechanisms through which prevention programs such as LST are effective, and ways to widely disseminate research-based programs into schools.*

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### INTRODUCTION

Despite the best efforts of teachers, parents, community leaders, and health professionals, adolescent drug use in the United States remains the highest in the

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industrialized world. After almost a decade of declining prevalence rates, adolescent drug use among youth in the United States increased substantially through much of the 1990s (Johnston, O'Malley, & Bachman, 2000). Epidemiological reports based on nationally representative samples of secondary school students along with evidence from national household surveys indicate marked upswings in alcohol, cigarette, and marijuana use during much of this time period. The increase in drug use has been observed among adolescents from different age and racial groups and for a variety of drugs. Recent data from the Monitoring the Future study (MTF; Johnston et al., 2000) and the Youth Behavior Risk Survey (YRBS; Kann et al., 2000) demonstrate that alcohol, tobacco, and marijuana are the most widely used substances among adolescents in the United States. When asked about substance use in the past month, at least one in three 12th graders report having been drunk or engaging in binge drinking (i.e., 5 or more drinks in a single occasion), one in three report smoking cigarettes, and one in four report using marijuana. Furthermore, in both the MTF and YRBS surveys, over half of 12th graders reported using marijuana in their lifetimes, making marijuana the most commonly used illicit drug among youth.

Perhaps of most concern is the fact that drug use among the very youngest cohorts has increased. Recent MTF data show that by the end of eighth grade, 35% of all adolescents have tried an illicit drug, and by the end of high school, approximately 50% of adolescents have initiated drug use. Although experimental or occasional use does not lead invariably to deleterious patterns of use, empirical evidence has accumulated showing that the early initiation of alcohol, tobacco, and other substances is associated with a variety of negative outcomes in later adolescence and early adulthood such as later more serious involvement in licit and illicit drug use, violent and delinquent behavior, poor physical health, and mental health problems (Ellickson, Tucker, & Klein, 2001; Griffin, Botvin, Doyle, Diaz, & Epstein, 1999; Newcomb & Bentler, 1988). Continued chronic drug use in adulthood can lead to physical, psychological, occupational, financial, legal, and interpersonal problems (Newcomb & Bentler, 1988).

### **The Importance of Drug Abuse Prevention**

The specter of increased morbidity and mortality related to early and continued drug use has helped to shape a public health agenda aimed at reducing teenage drug abuse (Office of National Drug Control Policy, 1997), and reducing use has become a major priority for federal, state, and local governments. Although there have been significant advances in the effectiveness of drug abuse treatment in recent years (Hartel & Glanz, 1997; National Institute on Drug Abuse, 1999), many treatments modalities are expensive, labor-intensive, and have high rates of recidivism. Preventive interventions and related initiatives are increasingly viewed as critical in addressing the problem of drug abuse. A recent review of drug abuse

prevention initiatives demonstrates that a wide variety of activities have been used to achieve the goal of reduced drug abuse, particularly among adolescents. These activities include educational and skills training activities that take place within schools, families, and communities; mass media public service announcements; policy initiatives such as required health warning labels on cigarettes and alcohol; changes in school rules (i.e., “zero-tolerance” policies); and laws and regulations such as increased cigarette taxes and minimum purchasing age requirements (Paglia & Room, 1999).

Fortunately, our understanding of the etiology and prevention of adolescent substance use has increased substantially over the past two decades. A variety of risk factors for early-stage substance use have been identified, as well as several protective factors that offset the effects of risk (for reviews, see Hawkins, Catalano, & Miller, 1992; Scheier, 2001). Research has shown that substance abuse results from a complex interaction of a number of different factors including cognitive, attitudinal, social, personality, pharmacological, biological, and developmental factors (Cicchetti & Luthar, 1999; Jessor & Jessor, 1977; Swadi, 1999). Social factors are the most powerful influences promoting the initiation of tobacco, alcohol, and drug abuse. These include the drug-related behavior and attitudes of significant others such as parents, older siblings, and friends (Andrews, Tildesley, Hops, & Li, 2002; Dishion & Owen, 2002). For example, studies reveal that parents’ use of alcohol, tobacco, marijuana, and other illicit drugs, and parental attitudes that are not explicitly against use, often translate into higher levels of use among children and adolescents (e.g., Windle, 1996). Poor family relationships and inadequate parenting practices (i.e., lack of parental monitoring) been identified as risk factors for youth substance use as well (Griffin, Botvin, Scheier, Diaz, & Miller, 2000). Other social influences include popular media portrayals showing substance use as an important part of popularity, sophistication, success, sex appeal, and good times (McCool, Cameron, & Petrie, 2001).

Additional studies have shown that youth with positive attitudes or expectancies regarding substance use and those who think that substance use is normative are more likely to become substance users than youth without these attitudes or beliefs (Piko, 2001; Simons-Morton et al., 1999). Furthermore, substance use has been found to be associated with a number of individual characteristics such as high negative affect (Shoal & Giancola, 2003), low self-control (Wills & Stoolmiller, 2002), and high sensation-seeking tendency (Kopstein, Crum, Celentano, & Martin, 2001), and these characteristics may stem from both psychological and biological mechanisms. The clinical literature also suggests that individuals with a specific psychiatric condition or symptoms (e.g., anxiety, depression) may use particular substances as a way of alleviating these feelings, as suggested by the self-medication hypothesis (Khantzian, 1997). Finally, although the pharmacology of commonly abused substances varies, recent animal research has found that several drugs of abuse (cocaine, amphetamine, morphine, nicotine, and alcohol) with different molecular mechanisms of action affect the brain in the

same way by increasing strength at excitatory synapses on midbrain dopamine neurons (Saal, Dong, Bonci, & Malenka, 2003). This suggests that a common neurochemical pathway explaining different types of drug abuse.

In addition, we know that drug use progresses in a well-defined sequence (Kandel, 2002; Kandel, Yamaguchi, & Chen, 1992), beginning in the early stages with cigarettes and alcohol, and progressing to the use of marijuana. The use of opiates, hallucinogens, and other illicit drugs typically occurs later in the sequence of substance use behaviors. Because this general pattern of drug use initiation and escalation is well documented, many prevention programs for adolescents aim to prevent early-stage substance use or at least delay the initiation or onset of use among youth. Many of these programs are provided to middle school or junior high school students because this is when many youth begin to experiment with substances. These programs typically target the use of tobacco, alcohol, and marijuana because these are the most widely used substances in our society and are the first substances that adolescents typically experiment with. Developing effective drug abuse prevention models is important not only because of its potential for reducing morbidity and mortality related to alcohol, tobacco, and marijuana use, but also because preventing early use of these gateway substances may delay, reduce, or prevent the use of other drugs further along the developmental progression, as well as the multiple negative outcomes associated with drug abuse.

### **Drug Abuse Prevention Approaches**

Considerable effort has been expended by schools and communities throughout the country in order to prevent the use and/or abuse of both licit and illicit drugs. These efforts have utilized a variety of prevention approaches (Botvin, Schinke, & Orlandi, 1995). The most ubiquitous of these are educational approaches that rely on the didactic presentation of factual information in an effort to increase knowledge and change attitudes, with the expectation that such changes will produce changes in behavior. Unfortunately, while these prevention approaches have in some cases been shown to influence knowledge and attitudes, they have not been found to change behavior (Moskowitz, 1989).

The most effective research-based approaches to the prevention of adolescent drug abuse are derived from psychosocial theories and focus primary attention on the psychosocial risk and protective factors that promote the initiation and early stages of drug use (Hawkins, Catalano, & Miller, 1992; Petraitis, Flay, & Miller, 1995). The social resistance skills approach to adolescent drug use prevention recognizes the role of various social influences including the direct modeling of drug use behavior and social pressure from peers. Other important social influences include persuasive advertising appeals and media portrayals encouraging alcohol, tobacco, and other drug use. Therefore, social influence programs focus extensively on teaching youth how to recognize and resist pressures

to use drugs and promote anti-drug use norms. The goal of these programs is to have students learn ways to avoid high-risk situations where they are likely to experience pressure to smoke, drink, or use drugs, as well as acquire the knowledge and skills needed to handle social pressure in these and other situations.

Another prevention approach combines social resistance skills training with competence enhancement skills building. According to the competence enhancement approach, drug use is conceptualized as a socially learned and functional behavior that is the result of interplay between social and personal factors. In addition to recognizing the importance of social learning processes such as modeling, imitation, and reinforcement, this approach posits that youth with poor personal and social skills are not only more susceptible to influences that promote drug use, but also are motivated to use drugs as an alternative to more adaptive coping strategies (Botvin, 2000). Thus, competence enhancement approaches to adolescent drug abuse prevention emphasize the teaching of generic social and personal skills in addition to resistance skills. Examples of the kind of competence skills included in this prevention approach are decision-making skills, interpersonal communication skills, assertiveness skills, and skills for coping with anxiety and anger. Several published meta-analytic studies indicate that the social influence and competence enhancement approaches are more effective than traditional didactic approaches, and that attitude and behavior change are most substantial in high intensity, multi-component social resistance and/or competence enhancement programs implemented with booster sessions after the initial intervention (Bangert-Drowns, 1988; Bruvold & Rundall, 1988; Tobler, 1986, 1992; Tobler & Stratton, 1997).

### **THE LIFE SKILLS TRAINING PROGRAM**

The Life Skills Training (LST) program is a multi-component competence-enhancement based preventive intervention that emphasizes drug resistance skills training within the context of a generic personal and social skills training model. The LST program is one of the most thoroughly evaluated evidence-based drug abuse prevention programs for middle school students. Over the past two decades, the LST program has been shown to be highly effective in a series of randomized, controlled efficacy studies and two large-scale effectiveness trials. Evaluation studies have consistently shown reductions in smoking, alcohol use, and marijuana use of 50% or more in students receiving the LST program relative to controls, as well as reductions in illicit drug use and improvements in a host of important risk and protective factors for adolescent drug abuse. Furthermore, prevention effects with the LST program have been found with a number of different program providers, with students from different geographic regions (e.g., urban, suburban, rural), socioeconomic, and racial-ethnic backgrounds. Based on this body of evidence, the LST program has been identified by many federal

agencies as one of the most effective prevention approaches currently available. LST has earned national recognition from the American Psychological Association, the Centers for Disease Control and Prevention, the American Medical Association, the National Institute on Drug Abuse, the National Cancer Institute, the Center for Substance Abuse Prevention, and the U.S. Justice Department's Office of Juvenile Justice and Delinquency Prevention. In summary, LST is one of the most extensively researched and effective prevention programs available and has been increasingly widely disseminated in recent years.

### **Program Overview and Core Components**

The LST prevention program consists of three major components. The first component is designed to teach students a set of general self-management skills, and the second focuses on general social skills. These two components are designed to enhance personal and social competence and to decrease motivations to use drugs and vulnerability to social influences that support drug use. The third component of LST focuses on information and skills that are specific to drug use in order to promote drug resistance skills, antidrug attitudes, and antidrug norms. Below is a brief description of the major components of the LST program.

#### *Personal Self-Management Skills*

The personal skills component of the LST program is designed to influence a broad array of self-management skills. To accomplish this, the personal skills component contains material to foster the development of decision-making and problem-solving (e.g., identifying problems, defining goals, generating alternative solutions, considering consequences), teaches skills for identifying, analyzing, and resisting media influences, and provides students with self-control skills for coping with anxiety (e.g., relaxation training) and anger/frustration (e.g., inhibiting impulsive reactions, reframing, using self-statements). Furthermore, students are encouraged to design a "self-improvement" project in which they select something about themselves that they would like to improve or change (e.g., a skill or behavior). Students learn how to set realistic goals and subgoals, evaluate and record their progress, and how to handle success and failure along the way. A goal of teaching these basic principles of personal behavior change and self-improvement is to enhance self-esteem.

#### *Social Skills*

The social skills component is designed to improve several important interpersonal skills in order to enhance general social competence. This social

skills component contains material designed to help students improve general interpersonal skills such as how to overcome shyness, how to give and receive compliments, how to initiate social interactions, as well as skills related to dating relationships and assertiveness (verbal and nonverbal).

### *Drug-Related Information and Skills*

This component is designed to have an impact on knowledge and attitudes concerning drug use, normative expectations, and skills for resisting drug use influences from peers and the media. This material is similar to that contained in many psychosocial drug abuse prevention programs that focus on the teaching of social resistance skills. This component of the LST program includes a focus on the short-term consequences of drug use, knowledge about the actual levels of drug use among adolescents and adults in order to correct normative expectations about drug use, information about the declining social acceptability of cigarette smoking and other drug use, information and class exercises demonstrating the immediate physiological effects of cigarette smoking, and material concerning peer and media pressures to smoke, drink, or use drugs and techniques for resisting these pressures.

### **Program Materials and Methods**

Curriculum materials have been developed to standardize the implementation of the LST program and increase its exportability. These materials consist of a Teacher's Manual and Student Guide for each year of the program (published by Princeton Health Press). The Teacher's Manual contains detailed lesson plans that describe the overall goals and objectives for each intervention session and provide the appropriate content and activities. The Student Guide contains class exercises, homework assignments, and reference material for each session.

The LST program is intended for middle or junior high school students and is implemented during 15 class periods (about 45 minutes each) in the first year which is typically grade seven. An additional two years of booster intervention are designed to reinforce the material covered during the first year. There are 10 booster sessions in grade eight and five booster sessions in grade nine. For school districts with a middle school, the LST program can be implemented with students in grades six, seven, and eight. There are additional (optional) sessions on violence prevention: three during year one, and two each in year two and three.

The LST program is taught using cognitive-behavioral skills training techniques, facilitated group discussion, classroom demonstrations, and traditional didactic teaching methods. The material is most effectively taught through facilitated group discussion and skills training exercise, although conventional teaching

methods are appropriate for some of the content. Because the major emphasis of the LST program is on the teaching of personal self-management skills, social skills, and drug resistance skills, the most important intervention method is skills training. The cognitive-behavioral skills in the LST program are taught using a combination of instruction, demonstration, behavioral rehearsal, feedback, social reinforcement, and extended practice in the form of behavioral homework assignments. Provider training typically consists of a one- or two-day training workshop to familiarize intervention providers with the prevention program and its rationale, and to provide an opportunity for trainees to learn and practice the skills needed to implement the prevention program successfully (Levy & Carella, 2001).

## EVIDENCE OF EFFECTIVENESS

A series of evaluation studies has been conducted over the past twenty years examining the effectiveness of the Life Skills Training program. Studies have ranged from small scale efficacy studies to large scale, randomized trials. These studies have consistently shown that the LST approach produces positive behavioral effects on alcohol, tobacco, and other drug use. Table I reviews selected peer-reviewed evaluation studies of the Life Skills Training program and includes brief descriptions of the student samples, intervention and evaluation designs, and main results from each study.

### Small Scale Efficacy Trials

The focus of the initial evaluation research of the LST program was on cigarette smoking and involved predominantly White middle-class populations. This research consisted largely of small-scale pilot studies testing the short-term effects of the intervention on cigarette smoking and related risk factors. Several early studies demonstrated that this prevention approach effectively reduces cigarette smoking among youth receiving the program compared to a control group that does not (e.g., Botvin, & Eng, 1980, 1982). During the first decade of evaluation research on this approach, additional studies examined its effectiveness with different delivery formats, different program providers, and with different substances. These studies found that the prevention approach was made more effective by the inclusion of booster sessions after the initial year of intervention and that it is equally effective when taught by teachers, peer leaders, and health educators (Botvin, Renick, & Baker, 1983). Additional studies found that the approach produced behavioral effects on alcohol and marijuana (e.g., Botvin, Baker, Botvin, Filazzola, & Millman, 1984; Botvin, Baker, Renick, Filazzola, & Botvin, 1984). These initial studies were among the first school-based prevention studies to show consistent behavioral effects on adolescent substance use.



Table I. Selected Studies Testing the Life Skills Training Program

Source	Subjects	Intervention approach	Evaluation design	Results
Botvin et al. (1989); <i>Public Health Reports</i>	Minority, Urban; (N = 608)	<ul style="list-style-type: none"> <li>• 12 sessions in 7th grade</li> </ul>	<ul style="list-style-type: none"> <li>• Pre- and post-test</li> </ul>	Reduced tobacco use; Increased knowledge of smoking consequences; Decreased normative expectations regarding smoking
Botvin et al. (1990); <i>Addictive Behaviors</i>	White, Suburban; (N = 998)	<ul style="list-style-type: none"> <li>• 20 sessions in 7th grade</li> <li>• 10 boosters in 8th</li> </ul>	<ul style="list-style-type: none"> <li>• Pre- and post-test</li> <li>• 1-year follow-up</li> <li>• Compared peer vs. teacher-led, controls</li> </ul>	Reduced tobacco, alcohol, and marijuana use in peer-led sessions with boosters and for females in teacher-led condition; Increased tobacco knowledge and anti-smoking attitudes
Botvin et al. (1990); <i>Journal of Consulting and Clinical Psychology</i>	White, Suburban; (N = 3684)	<ul style="list-style-type: none"> <li>• 15 session in 7th grade</li> <li>• 10 boosters in 8th</li> <li>• 5 boosters in 9th</li> </ul>	<ul style="list-style-type: none"> <li>• Pre- and post-test</li> <li>• 3-year follow-up</li> <li>• Compared training workshops vs. videotape, controls</li> </ul>	Reduced cigarette, marijuana, and alcohol use; Decreased normative expectations; Increased substance use knowledge; Increased interpersonal and communication skills
Botvin et al. (1992); <i>Health Psychology</i>	Minority, Urban; (N = 3153)	<ul style="list-style-type: none"> <li>• 15 session in 7th grade</li> </ul>	<ul style="list-style-type: none"> <li>• Pre- and post-test</li> <li>• School-level analysis</li> </ul>	Reduced cigarette use; Decreased normative expectations regarding peer and adult smoking; Increased smoking knowledge
Botvin et al. (1994); <i>Psychology of Addictive Behaviors</i>	Minority, Urban; (N = 639)	<ul style="list-style-type: none"> <li>• 15 session in 7th grade</li> </ul>	<ul style="list-style-type: none"> <li>• Pre- and post-test</li> <li>• Compares generic skills-training, culturally-focused, controls</li> </ul>	Both programs reduced intentions to drink alcohol; Generic program reduced intentions to use illicit drugs; Increased anti-drug attitudes; Decreased risk taking
Botvin et al. (1995); <i>Psychology of Addictive Behaviors</i>	Minority, Urban; (N = 456)	<ul style="list-style-type: none"> <li>• 15 session in 7th grade</li> <li>• 10 boosters in 8th</li> </ul>	<ul style="list-style-type: none"> <li>• Pre- and post-test</li> <li>• 2-year follow-up</li> </ul>	Reduced current alcohol use and intentions to drink alcohol; Increased drug refusal skills
Botvin et al. (1995); <i>Journal of the American Medical Association</i>	White, Suburban; (N = 3597)	<ul style="list-style-type: none"> <li>• 15 session in 7th grade</li> <li>• 10 boosters in 8th</li> <li>• 5 boosters in 9th</li> </ul>	<ul style="list-style-type: none"> <li>• Pre- and post-test</li> <li>• 6-year follow-up</li> </ul>	Reduced drug and polydrug use; Strongest effects for those receiving a more complete version of the program

Table I. Continued

Source	Subjects	Intervention approach	Evaluation design	Results
Botvin et al. (1997); <i>Journal of Child and Adolescent Substance Abuse</i>	Minority, Urban; (N = 721)	<ul style="list-style-type: none"> <li>• 15 session in 7th grade</li> </ul>	<ul style="list-style-type: none"> <li>• Pre- and post-test</li> </ul>	Reduced current smoking, alcohol, and marijuana use; Reduced polydrug use
Botvin et al. (1999); <i>Journal of the American Medical Women's Association</i>	Minority, Urban girls; (N = 2209)	<ul style="list-style-type: none"> <li>• 15 session in 7th grade</li> <li>• 10 boosters in 8th</li> </ul>	<ul style="list-style-type: none"> <li>• Pre- and post-test</li> <li>• 1-year follow-up</li> </ul>	Reduced initiation of smoking and escalation to monthly smoking; Prevention effects mediated in part by reduced normative expectations, behavioral intentions, risk-taking, and increased refusal skills
Botvin et al. (2000); <i>Addictive Behaviors</i>	White, Suburban; (N = 447)	<ul style="list-style-type: none"> <li>• 15 session in 7th grade</li> <li>• 10 boosters in 8th</li> <li>• 5 boosters in 9th</li> </ul>	<ul style="list-style-type: none"> <li>• Pre- and post-test</li> <li>• 6.5 year follow-up</li> </ul>	Reduced overall illicit drug use; reduced use of hallucinogens, heroin and other narcotics
Botvin et al. (2001a); <i>Prevention Science</i>	Minority, Urban; (N = 3621)	<ul style="list-style-type: none"> <li>• 15 session in 7th grade</li> <li>• 10 boosters in 8th</li> </ul>	<ul style="list-style-type: none"> <li>• Pre- and post-test</li> <li>• 1-year follow-up</li> </ul>	Reduced smoking, drinking, drunkenness, inhalant use, and polydrug use; Prevention effects mediated in part by reduced normative expectations, behavioral intentions, and risk-taking
Botvin et al. (2001b); <i>Psychology of Addictive Behaviors</i>	Minority, Urban; (N = 3041)	<ul style="list-style-type: none"> <li>• 15 session in 7th grade</li> <li>• 10 boosters in 8th</li> </ul>	<ul style="list-style-type: none"> <li>• Pre- and post-test</li> <li>• 1-year follow-up</li> <li>• 2-year follow-up</li> </ul>	Reduced binge drinking at the one- and two-year follow-up points; Reduced pro-drinking attitudes and normative expectations for peer drinking
Griffin et al. (2003); <i>Preventive Medicine</i>	High-risk, Minority, Urban; (N = 758)	<ul style="list-style-type: none"> <li>• 15 session in 7th grade</li> <li>• 10 boosters in 8th</li> </ul>	<ul style="list-style-type: none"> <li>• Pre- and post-test</li> <li>• 1-year follow-up</li> </ul>	Reduced smoking, drinking, inhalant use, and polydrug use at the one-year follow-up among a subsample of youth at high risk for substance use initiation

### Large Scale Effectiveness Trials

More recent evaluation research on the LST approach has focused on the intervention's long-term effects on drug use, effects on more serious levels of drug involvement including illicit drug use, its impact on hypothesized mediating variables, and has increasingly focused on effects when used with inner-city minority populations. The evaluation designs have become increasingly sophisticated with time, including two large-scale multi-site randomized prevention trials with long-term follow-up.

The first of these randomized controlled prevention trials focused on a predominantly White, suburban sample of youth. Beginning in 1985, this prevention trial examined the short- and long-term effects of the LST approach among close to 6,000 students from 56 junior high schools in New York State. This study was one of the largest and most methodologically rigorous drug abuse prevention trials ever conducted and included adolescents that were predominantly White (91%). Students in the prevention condition received the intervention in the 7th grade and booster sessions during the eighth and ninth grades. Significant prevention effects were found among intervention participants at the end of the ninth grade in terms of cigarette smoking, marijuana use, and immoderate alcohol use (Botvin, Baker, Dusenbury, Tortu, & Botvin, 1990) as well as at the end of the twelfth grade (Botvin, Baker, Dusenbury, Botvin, & Diaz, 1995). In the latter follow-up study, there were significantly fewer smokers, heavy drinkers, marijuana users and polydrug users among students who received the prevention program relative to controls. The strongest prevention effects were produced for the students who received the most complete implementation of the prevention program. A related study using data from a confidential and random subsample of these students ( $N = 447$ ) found that there were lower levels of overall illicit drug use and lower levels of use for hallucinogens, heroin and other narcotics in the intervention group relative to controls (Botvin et al., 2000).

A recent large-scale prevention trial tested the LST approach among inner-city minority youth in New York City. The sample was predominantly African-American (61%) and Hispanic (22%) and consisted of students ( $N = 3,621$ ) in 29 urban middle schools. Results at the posttest and one-year follow-up indicated that those who received the prevention program reported less smoking, drinking, drunkenness, inhalant use, and polydrug use relative to those in the control group who did not receive the intervention (Botvin, Griffin, Diaz, & Ifill-Williams, 2001a). Two additional studies using data from this large-scale trial focused on prevention effects of the intervention program in terms of cigarette smoking onset and binge drinking. The first of these studies examined the effectiveness of the prevention program in reducing the initiation and escalation of smoking in a subsample of girls from the larger study (Botvin, Griffin, Diaz, Miller, & Ifill-Williams, 1999). One-year follow-up data indicated that girls who participated in

the intervention condition were significantly less likely to initiate smoking relative to controls, and 30% fewer of participants escalated to monthly smoking relative to students in the control group.

A second study showed that this intervention approach had protective effects in terms of binge drinking (5 or more drinks per drinking occasion) among inner-city, middle-school boys and girls (Botvin, Griffin, Diaz, & Ifill-Williams, 2001b). In this study, the proportion of binge drinkers was over 50% lower in those who received the prevention program relative to the control group at both the one-year and two-year follow-up assessments. Finally, a recent study of a subset of students from the larger sample examined the effectiveness of the prevention program among youth at high risk for substance use initiation and found that those students who had poor grades in school and friends that engage in substance use were less likely to engage in smoking, drinking, inhalant use, or polydrug use compared to similarly matched controls that did not receive the intervention (Griffin, Botvin, Nichols, & Doyle, 2003). Taken together, the results from several large-scale randomized prevention trials provide strong evidence of the effectiveness of this prevention approach, both with suburban White youth as well as inner-city minority youth.

## MEDIATING MECHANISMS

In this section we review etiology and intervention studies that provide evidence for the mediating mechanisms through which competence skills protect young people from drug abuse and potential mechanisms through which the Life Skills Training program is effective.

### **Understanding the Protective Effects of Competence Skills**

A series of etiology studies examining mediating mechanisms has been conducted by our research group at Cornell University in an attempt to explore the roles of social influences, psychosocial characteristics, and social and personal competence skills in the etiology of adolescent substance use. Our research on mediating mechanisms has increased our knowledge about the protective role of competence skills in the development of adolescent substance use.

Three findings that have emerged from our research are that competence skills protect youth from substance use 1) by increasing psychological well being; 2) by reducing positive expectancies regarding the social benefits of drug use; and 3) by increasing refusal assertiveness. We have conducted two studies examining the relationships among competence skills, psychological distress and well being, and substance use during the junior high school years. A unique feature of these studies was that psychological distress and well-being were specified as distinct

potential mediators of this relationship, which is consistent with the resurgence of interest in the possible independence of positive and negative affect (e.g., Russell & Carroll, 1999).

One study included a predominantly White suburban sample of students ( $N = 849$ ) attending 22 junior high schools in upstate New York (Griffin, Scheier, Botvin, & Diaz, 2001). In a longitudinal three-year study, structural equation modeling indicated that greater competence skills predicted less subsequent distress and greater well-being. While psychological well-being was associated with less subsequent substance use, distress did not predict later substance use. A final model revealed that the effect of personal competence skills on later drug use was fully mediated by greater psychological well-being, after controlling for baseline levels and change over time for each construct. Furthermore, although good competence skills were associated with less distress, this effect did not reduce subsequent drug use. The findings illustrate that well-being plays a central role in mediating the relationship between early competence skills and decreased later use of tobacco, alcohol, and marijuana.

A subsequent study replicated this general finding in a multi-ethnic (predominantly Black) inner-city sample during early adolescence (Griffin, Botvin, Scheier, Epstein, & Diaz, 2002). An additional study included well-being (but excluded distress) and found that competence skills has a similar relationship with well-being and alcohol use in a multi-ethnic, predominantly Hispanic sample (Epstein, Griffin, & Botvin, 2002). Taken together, these findings offer compelling evidence that competence skills promote resilience against early stage substance use in part by enhancing psychological well-being. However, more work is needed to better understand these associations through expanded model testing that includes new mediators and cross-validation in diverse samples.

Additional studies have shown that highly competent youth are less likely to use drugs because they have less positive expectancy regarding the social benefits of substance use. One study consisted of rural youth ( $N = 1,568$ ) attending 36 junior high schools in a midwestern state (Griffin, Epstein, Botvin, & Spoth, 2001). Structural equation modeling indicated that social competence had a direct protective association with substance use in that those youth who were more socially confident, assertive, and had better communication skills reported less smoking and drinking. Further analyses revealed that the relationship between social competence and substance use was fully mediated by social benefit expectancies of use. These findings suggest that poorly competent youth turn to smoking and alcohol use because they perceive that there are important social benefits to doing so, such as having more friends, looking grown up and "cool," and having more fun. Prevention programs that teach youth interpersonal skills may reduce the initiation of substance use by improving social competence and providing youth with more adaptive means of gaining approval from peers.

A second study found similar effects among inner-city minority youth in terms of the perceived social benefits of smoking (Epstein, Griffin, & Botvin, 2000a).

This study examined a sample of 1,459 students attending 22 middle and junior high schools in New York City. Findings indicated that a deficiency in competence (poor decision-making skills and low personal efficacy) was linked to positive beliefs in the benefits of smoking, which were then related to increased subsequent smoking. Two additional studies showed that greater competence predicted higher refusal assertiveness which was protective in terms of smoking (Epstein, Griffin & Botvin, 2000b) and drinking (Epstein, Griffin & Botvin, 2000c) at follow-up assessments. Taken together, these findings suggest that competence skills are protective in a variety of ways and that competence enhancement prevention programs such as LST may work in part by increasing well being, reducing positive expectancies regarding the social benefits of substance use, and by increasing refusal assertiveness among youth.

In summary, competence enhancement prevention programs have been found to effectively prevent adolescent substance use, and etiology research has begun to examine the mechanisms through which competence is protective in terms of adolescent drug involvement. While progress has made in investigating these mediating mechanisms, new etiologic models that incorporate additional mediating constructs need to be developed, tested, and refined in order to expand upon our current findings and extend our initial models. Furthermore, research is needed that expands upon the protective effects of competence skills on substance use within the broader context of family, school, and neighborhood influences. Finally, research is needed to test whether existing and new potential hypothesized mediators are influenced by preventive intervention programs such as the LST program.

### **Identifying “Active Ingredients” of Effective Interventions**

Many prevention studies focus on the efficacy of a particular prevention approach in terms of its impact on alcohol, tobacco, and other drug use. However, there is an increasing recognition of the need to examine program effects on hypothesized mediating variables and the extent to which changes in these variables lead to changes in drug use behavior (Botvin et al., 1992; Donaldson et al., 1994, 1996; Hansen & McNeal, 1997). A focus on mediating mechanisms in evaluation studies is important because it can identify the “active ingredients” in existing prevention programs, inform ways to refine existing programs, and provide new information to guide future prevention program development. Identifying how effective prevention programs work can also lead to further refinements of the theories upon which current prevention approaches are based.

Despite the success of several school-based studies in demonstrating direct program effects on lowered rates of drug use, only a handful of studies have examined mediational mechanisms in the prevention of adolescent drug use (Bell, Ellickson & Harrison, 1993; Botvin et al., 1992; Donaldson, Graham, & Hansen,

1994; MacKinnon et al., 1991). Indeed, some studies have produced unexpected results. For example, MacKinnon et al. (1991) examined mediation with a 10-session social influence based program that included elements of normative education and social competence training. Significant program effects in the hypothesized direction were obtained for drug use (previous months' cigarette, alcohol, and marijuana use), drug use intentions for the same three substances, perceived positive drug consequences, communication skills, and friends' reactions to drug use. However, no program effects were found for drug resistance skills or normative expectations for peer drug use. The inability to obtain significant findings with respect to resistance skills and peer norms was unexpected because modifying resistance skills and normative beliefs are major theoretical components of social influence-based programs.

In terms of the LST program, several studies have examined the impact of the intervention on mediating variables (e.g., Botvin, Baker, Dusenbury, et al., 1990; Botvin et al., 1992, 1994, 1999; Botvin, Schinke, et al., 1995). Findings indicate that the LST program has significant program effects on several hypothesized mediators, including knowledge and attitudes, assertiveness, refusal skills, risk-taking, locus of control, social anxiety, decision-making, and problem-solving. However, not all studies have found significant prevention effects on all of these variables. Further research is needed to understand the reason for the lack of consistency in the impact of the intervention on these variables from study to study.

Other LST intervention studies have examined the extent to which specific variables actually mediate the effects of the program on tobacco, alcohol, or marijuana use. Most of these studies have used conventional regression methods for testing mediation as outlined by Baron and Kenny (1986) and Judd and Kenny (1981). Studies have found that changes in perceived norms (Botvin et al., 1992, 1999), refusal skills (Botvin, Schinke, et al., 1995; Botvin et al., 1997, 1999), and risk-taking (Botvin et al., 1997, 1999) significantly mediate the effects of the prevention program on substance use. For example, in the recent large-scale prevention trial of LST conducted with an inner-city minority sample in 29 New York City middle schools (Botvin, Griffin, Diaz, & Ifill-Williams, 2001a), prevention effects on drug use outcomes were found to be mediated in part by risk-taking and peer normative expectations regarding drug use. In a subset of girls from this sample, the LST program reduced the initiation and escalation of smoking partly through its effects on perceived peer and adult smoking norms, drug refusal skills, and risk taking (Botvin, Griffin, Diaz, Miller, & Ifill-Williams, 1999).

Other research has examined the impact of the LST program on drug use progression. In one study, we examined the plausibility of the gateway hypothesis to account for drug involvement in a sample of middle school students participating in the LST program (Scheier, Botvin, & Griffin, 2001). In a series of structural equation models, the prevention program was found to lead to improvements in social competence that reduced multiple drug use at 1- and 2- year

follow-ups. Furthermore, drug use progression was disrupted by program effects leading to decreased alcohol and cigarette use over one year and reduced cigarette use over a two year period. Controlling for previous drug use, alcohol was integrally involved in the progression to multiple drug use. Subgroup analyses based on distinctions of pretest use/nonuse of alcohol and cigarettes provided partial support for the gateway hypothesis. However, evidence also supported alternate pathways including cigarette use as a starting point for later alcohol and multiple drug use. Findings illustrate the utility of targeting more than one gateway substance to prevent escalation of drug involvement and reinforce the importance of social competence enhancement as an effective deterrent to early-stage drug use. While the research conducted thus far examining the impact of the LST program on hypothesized mediators and attempts to identify specific mediating mechanisms are important first steps, it is clear that additional research is needed in this area.

## RECENT APPLICATIONS AND FUTURE DIRECTIONS

An important advantage of competence enhancement approaches to prevention, such as the LST program, are that they are inherently applicable to multiple substances and multiple problem behaviors. This is because they are designed to teach life skills and enhance general competence, teaching the kind of skills for coping with life that will have a relatively broad application. These skills are taught with direct application to drug use and abuse, but can also be used for dealing with the many challenges confronting adolescents in their everyday lives. Thus competence enhancement programs can expand the focus of intervention to a variety of problem behaviors.

### Preventing Violence and Aggression

In particular, competence enhancement may be a useful approach to preventing youth violence and aggression. Like drug abuse, interpersonal violence is a major public health problem that contributes to morbidity and mortality rates among youth (Koop & Lundberg, 1992). Programs to prevent violence and aggression have traditionally been developed and implemented independently of adolescent drug abuse prevention programs. However, because substance use and interpersonal violence share similar etiological factors related to peer social influences and poor social and personal skills, a common prevention approach may be able to address the underlying determinants of both behaviors and possibly others.

We recently examined the effects of an expanded version of the Life Skills Training program that included material on anger management and conflict resolution on preventing aggression and delinquency (Botvin, Griffin, Nichols, & Doyle, 2002). Students who received the expanded LST program reported less



verbal aggression, physical aggression, and delinquency than comparable controls at the posttest assessment. Students in the prevention condition were less likely to “say mean things,” argue, pick a fight, or shoplift compared to controls. Moreover, as in previous studies with the LST program focusing on drug use, prevention effects were strongest among students receiving a more complete implementation of the program (in this case, at least half of the LST program). These students reported significantly less verbal aggression, physical aggression, and delinquency than controls. In order to further explore for whom this prevention program works, analyses were conducted on select subgroups defined by gender (males and females), family structure (two-parent vs. single-parent families), academic performance (students receiving As and Bs vs. those receiving Cs or lower), and substance use status (cigarette/alcohol users vs. non-users). Findings indicated, for example, that there were significant program effects for verbal aggression among students of low academic standing and for students from single-parent families. Indeed, across all subgroup analyses, the prevention program had the strongest impact on individuals at higher risk for aggression and delinquency including adolescents from single-parent families, receiving poor grades, and using tobacco or alcohol, when such differences were found.

### **Increasing Implementation Fidelity**

While the number of research-based prevention programs has increased in recent years, a gap remains in what we know about how to effectively translate these programs into practice. A theoretical model that is useful for conceptualizing the process of bringing effective prevention programs to scale is the diffusion of innovations model developed by Rogers (1995). Diffusion of innovation has been described as the process by which new knowledge is “communicated through specific channels over time among members of a social system” (Rogers, 1995, p. 5) and this model represents a useful starting point for developing strategies to encourage organizations and individuals to adopt efficacious programs and practices. Rogers proposes that the process of diffusing innovative health behavior interventions (such as evidence-based drug abuse prevention programs) involves four stages: dissemination, adoption, implementation, and maintenance. As described by Rogers, dissemination refers to the process by which effective innovations are spread or distributed, adoption refers to the decision processes by which organizations decide to use an innovation, implementation refers to the degree to which the program is delivered with fidelity to its original design, and maintenance refers to how a program is institutionalized over time. Research is needed on each stage of the diffusion process so that the public health benefits of evidence-based prevention programs can be realized. In fact, now that effective programs have been developed, these challenges represent the important next steps that the field of prevention must consider.

Because the LST program has been widely disseminated and adopted, a fruitful focus of future research may be in the two latter stages of diffusion: implementation and maintenance. Despite the fact that LST is one of the most widely used evidence-based drug abuse prevention program for middle school students in the United States (Hallfors & Godette, 2002), research has shown that implementation rates by classroom teachers vary widely and may sometimes be delivered with less than adequate fidelity. This is true even under controlled research settings. For instance, in our own study testing the effectiveness of the LST program in 56 New York State schools (Botvin et al., 1990), implementation rates were observed by trained monitors and results showed that on average only 68% (range = 27% to 97%) of the material in the curriculum was covered and that one in four students had teachers who implemented less than 60% of the important points of the lessons. In more recent work in inner-city schools (Botvin et al., 2001 a) we found that the implementation fidelity score, or the proportion of LST program points covered by program providers, was 48% across all program sessions. This rate of implementation fidelity is lower than in similar studies conducted with suburban White youth, and suggests that implementing a prevention program with high fidelity is even more difficult in urban school settings relative to suburban school settings.

Clearly, a growing concern is that as evidence-based programs are taken to scale, implementation fidelity may be worse than during effectiveness trials testing these programs, and effectiveness may be compromised in real-world settings where teachers are not trained as well or monitored when providing the program. Research has shown that implementation quantity and quality determine how effective prevention programs will be. Studies that have included an analysis of implementation fidelity (i.e., process evaluations) have consistently shown superior outcomes when the program has been implemented with high fidelity (Gresham, Gansle, Noell, Cohen & Rosenbaum, 1993). In fact, in one of the largest meta-analyses of school-based substance abuse prevention programs, Tobler and Stratton (1997) concluded that problems related to program implementation have the largest impact in decreasing the effectiveness of these programs.

In a recent study of prevention programs in 104 school districts in 12 states, only 19% of the schools were found to be implementing research-based prevention programs with fidelity (Hallfors & Godette, 2002). Common barriers to high quality implementation in that study included lack of teacher training, lack of program materials, low levels of funding, decentralized decision making and lack of program guidance from school district personnel. Despite these problems, only recently have evaluation studies started to focus on or measure program implementation. One review of 181 school-based prevention studies published between 1980 and 1990 in seven journals known for behaviorally-based interventions found that only 15% measured implementation integrity (Gresham et al., 1993). Thus, it is critical for future prevention research to include process evaluations and to integrate implementation fidelity into the analyses of outcome effects. These steps will

enable researchers to systematically examine the implementation process of prevention program, begin to identify the factors that impede and enhance high quality implementation across diverse settings, and provide information that can help address the problem and identify ways to improve program implementation fidelity.

## SUMMARY AND CONCLUSIONS

Alcohol, tobacco, and other drug use are important problems that typically begin during adolescence. Fortunately, substantial progress has been made in developing effective drug abuse prevention programs for youth over the past two decades. Prevention approaches that focus on the risk and protective factors associated with drug use initiation and those that teach skills related to social resistance are most effective. The Life Skills Training (LST) program is an effective primary prevention program for adolescent drug abuse that focuses on these factors as well as enhancing social and personal competence skills. This paper provides an overview of the theoretical underpinnings of the LST program, along with a description of the program's components, materials, and methods. Findings from over two decades of evaluation research demonstrate that the LST approach consistently produces positive behavioral effects on alcohol, tobacco, and other drug use. Competence enhancement-based primary prevention programs may play an important role in preventing other negative behaviors during adolescence. A major challenge in bringing evidence-based programs to scale is the issue of how to implement programs with high fidelity in field settings.

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