

LIFE SKILLS TRAINING: A COMPETENCE ENHANCEMENT APPROACH TO TOBACCO, ALCOHOL, AND DRUG ABUSE PREVENTION

Gilbert J. Botvin and Kenneth W. Griffin

This chapter examines Life Skills Training (LST), a school-based preventive intervention designed to prevent adolescent substance use and abuse. LST targets key etiologic factors as described in a conceptual framework derived from social learning theory and problem behavior theory. The LST program consists of three major components: (a) a personal competence component that teaches self-management skills, (b) a social competence component that teaches an array of social skills, and (c) a drug resistance component that teaches health-related content, resistance skills, and pro-health attitudes and norms. LST has been extensively tested in a series of randomized trials and found effective in preventing the use/misuse of tobacco, alcohol, marijuana, and other psychoactive drugs. Over 30 years of research shows that LST works with a wide range of students, cuts the use of psychoactive substances in half, and reduces other health-risk behaviors. Findings indicate that the program is effective when implemented under different delivery conditions, by different program providers, with different age groups, and with different populations. Follow-up studies have provide evidence of the long-term effectiveness of LST. Independent economic analysis indicates that LST produces cost

savings of \$38 for every dollar invested. Finally, LST offers the potential for reducing other health-risk behaviors and fostering academic success.

Given the public health imperative to reduce the mortality and morbidity associated with substance use and abuse, and the growing body of high-quality prevention research, the National Institutes of Health and other leading government agencies have convened expert panels to identify effective prevention programs and policies in an effort to guide practitioners, policymakers, and other decision makers. The LST program has been identified by multiple expert panels as meeting the standard of evidence required to be considered effective. In addition to being one of the most rigorously and extensively tested substance abuse prevention approaches, LST is also one of the most widely disseminated evidence-based programs available. To date, it has been implemented throughout the United States and in 35 countries worldwide.

This chapter describes the LST approach, discusses its theoretical foundations, and reviews its content, materials, provider training, and intervention methods. The chapter summarizes the results from a large body of empirical research demonstrating the effectiveness of the LST in preventing the

Correspondence concerning this chapter should be directed to Gilbert J. Botvin, Department of Healthcare Policy and Research, Weill Medical College of Cornell University, 402 East 67th Street, Concourse 1, New York, NY 10065 or at gjbvotin@med.cornell.edu. See <http://www.lifeskillstraining.com> for more information about Life Skills Training.

<http://dx.doi.org/10.1037/14550-011>

Handbook of Adolescent Drug Use Prevention: Research, Intervention Strategies, and Practice, L. M. Scheier (Editor)
Copyright © 2015 by the American Psychological Association. All rights reserved.

use/misuse of tobacco, alcohol, and other drugs. It also describes the research methods used and summarizes findings on mediation that illustrate potential mechanisms of the intervention effects. Finally, it describes the application of LST to different populations, settings, and health-risk behaviors, and discusses potential educational benefits and findings from several cost–benefit studies.

THEORETICAL FOUNDATIONS

Early research testing the effectiveness of tobacco, alcohol, and illicit drug abuse prevention approaches produced disappointing results (Tobler & Stratton, 1997). One reason for the failure of those approaches was that they were not well-grounded in theory and etiologic research, a necessary precondition for developing effective preventive interventions. Etiology research indicates that there is no single necessary and/or sufficient cause that invariably leads to adolescent substance use. Instead, the use of one or more substances is the result of a combination of cognitive, social, personality, pharmacological, biological, and developmental factors, along with an array of environmental or contextual influences (Botvin, 2000; Cicchetti & Luthar, 1999; Hawkins, Catalano, & Miller, 1992; Scheier, 2010).

Although tobacco, alcohol, drug abuse, violence, and other health-risk behaviors are multiply determined, the most effective contemporary approaches to prevention are well-grounded in psychosocial theory. LST relies primarily on social learning theory (Bandura, 1977) and problem behavior theory (Jessor & Jessor, 1977). Social learning theory posits that learning occurs within a social context and results from a process of observation, imitation, and modeling. Problem behavior theory is an extension and application of social learning theory to adolescent problem behaviors. Social factors, particularly from peers and high-status role models (e.g., entertainment celebrities), can be a source of influence encouraging a range of problem behaviors, including health-risk behaviors. Intrapersonal factors affect motivation to engage in these behaviors and interact with interpersonal (social) factors to increase (or decrease) risk. Intrapersonal factors are also important because some can moderate the impact of nega-

tive social factors by affecting susceptibility to those influences (Botvin, 2000; Flay, 1987).

Social learning theory and problem behavior theory have both been applied to health-risk behaviors such as tobacco, alcohol, and illicit drug use. From the perspective of these theories, substance use is a socially learned and functional behavior that is acquired through a process of observation, modeling, and reinforcement, and results from the interaction of social factors and intrapersonal factors, including cognitions (i.e., knowledge, attitudes, and expectancies), skills, and personality factors. Social influences to engage in substance use may come from family members (e.g., parents, older siblings), peers, and/or the mass media. For example, adolescents are at increased risk of initiating substance use if their family members or friends smoke, drink, or use drugs and/or convey positive attitudes and expectancies regarding these behaviors. Furthermore, risk for substance use can be increased through exposure to celebrities and other high-status role models in the media who smoke, drink, or use drugs or promote positive attitudes and expectancies regarding substance use.

The risk of substance use initiation is influenced by a constellation of additional intrapersonal factors. Adolescents are more likely to engage in substance use if they are unaware of its potential deleterious effects on health, physical performance, or appearance; if they have positive attitudes toward or believe there are important beneficial outcomes (i.e., expectancies) associated with substance use; or if they have inaccurate (i.e., elevated) normative beliefs regarding the prevalence and social acceptability of substance use. Adolescents are more likely to engage in substance use if they lack the resistance skills necessary to identify, avoid, and/or resist high-risk social situations involving peer or media pressures to smoke, drink, or use drugs. The risk of substance use initiation is higher among adolescents who have poor self-management skills (e.g., lacking in adequate skills for making decisions and solving problems, coping with anxiety and stress) and poor social skills (e.g., lacking in general assertiveness skills and/or adequate skills for communicating effectively, meeting people, developing social relationships). Finally, adolescents are more vulnerable

to prodrug social influences from peers or the media if they possess certain personality characteristics (e.g., low self-esteem, poor self-efficacy, high anxiety, impulsivity, rebelliousness).

CONCEPTUAL MODEL GUIDING LST

Figure 10.1 presents a conceptual model of drug use initiation that incorporates key elements of social learning theory and problem behavior theory. The model provides a useful framework for organizing key etiologic domains, identifying potential points of intervention (e.g., school, family, individual), as well as targets of intervention within a given domain of interest (e.g., specific intrapersonal, etiologic factors). In the model, several contextual and psychosocial domains are conceptualized as superordinate constructs that comprise a causal framework of drug initiation. The left side of the figure includes contextual factors. On the top left of the figure, the sociocultural domain consists of key demographic factors (e.g., age, gender, social class), and cultural factors (e.g., ethnic identity, acculturation). The family domain consists of factors such as family-management practices, family communication, discipline, parental monitoring, family substance use, and family attitudes toward substance use. The social-environment

domain includes community factors (e.g., community resources, neighborhood organizations); school factors (e.g., school bonding, school size, school climate); media influences that foster positive attitudes, expectancies, and norms that promote substance use (e.g., movies, TV shows, advertising, music, the Internet); peer influences (i.e., peer drug use and produg attitudes); and drug availability.

Together, these social-environmental factors shape and interact with intrapersonal factors, which are organized into three major domains: two relate to generic skills and competencies and one relates specifically to drug abuse and other health-risk behaviors. Starting from the top middle of the figure, these domains include personal competence skills (e.g., self-management skills such as decision making), social competence skills (e.g., communication skills, assertive skills), and the drug resistance domain which includes cognitive and attitudinal factors (e.g., knowledge, norms, expectancies related to drug use) and a set of skills specific to resisting peer and media influences to smoke, drink, or use illicit drugs. The next domain includes personality and other psychological factors (e.g., self-efficacy, self-esteem, impulsivity) that mediate the influence of social-environmental factors and intrapersonal factors on tobacco, alcohol, drug abuse, and other

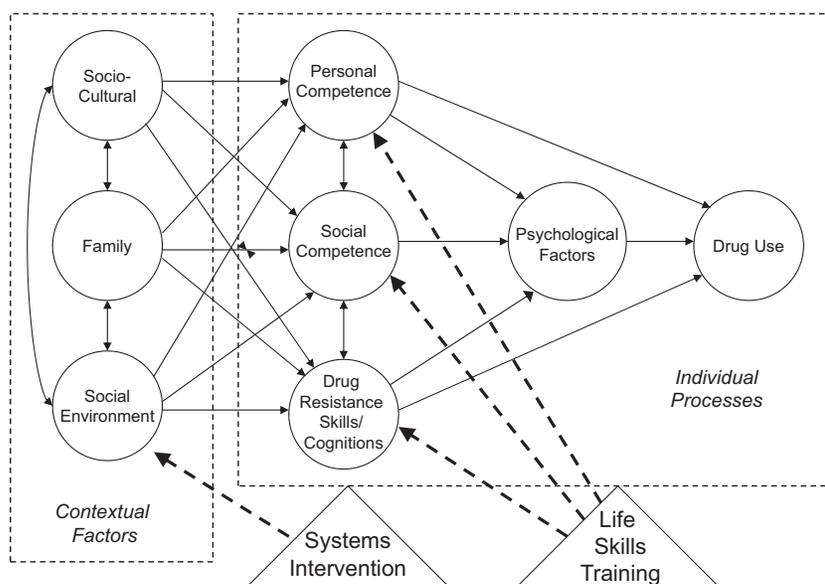


FIGURE 10.1. Model of individual and contextual factors in adolescent drug use and targets of intervention.

health-risk behaviors. This conceptual model helped guide the development of the LST program and illustrates how components of LST target specific intrapersonal etiologic factors.

PROGRAM DESCRIPTION

The LST program is a school-based intervention designed to prevent tobacco, alcohol, and drug abuse. LST is primarily conceptualized as a universal prevention program intended to be implemented with all students on a grade level. However, LST can also be used as a selective prevention program for high-risk youth. LST was originally developed to prevent cigarette smoking. Over the years, the program was expanded to include a focus on alcohol, marijuana, and other illicit drugs, as well as aggression and violence. Studies indicate that favorable program effects from LST generalize to other health-risk behaviors, such as risky driving and sexual behaviors that increase risk for HIV/AIDS. In its original form, LST consisted of 10 class sessions. As the content increased, so did the number of sessions. Moreover, booster years were added in order to maintain and/or enhance the initial prevention effects. Currently the LST middle/junior high school program consists of 15 class periods in the first year, 10 class periods in the second year, and five class periods in the third year. The LST program is designed to be taught in a logical sequence at a rate of one or more sessions per week.

PROGRAM COMPONENTS

The LST program consists of three major components: (a) a personal competence component that teaches self-management skills; (b) a social competence component that teaches an array of social skills; and (c) a drug resistance component that teaches health-related content, resistance skills, and prohealth attitudes and norms. Each component consists of several units designed to be taught in one or more class periods. Many of the skills taught in the LST program are derived from cognitive behavior therapy (CBT). However, instead of using these CBT skills in a therapeutic setting to remediate existing problems, they are taught in an

educational setting to prevent the development of potential problems. The LST program components are designed to work in synergy to help young people successfully navigate developmental tasks, to increase resilience, and to facilitate healthy psychosocial development.

Personal Competence

The personal competence component is designed to teach an array of individual self-management skills. One unit contains material designed to foster the development of problem-solving and decision-making skills. For example, the program teaches students how to identify problem situations or important decisions they need to make, identify goals, generate alternative solutions, consider potential consequences, make a final decision, and take the appropriate action. In another unit, students are taught to identify media influences that can influence their behavior, such as those coming from movies, TV, and the Internet. Students are taught skills for identifying, analyzing, interpreting, and resisting these various sources of influence from the media.

The unit on advertising is designed to increase awareness of the purpose and function of advertising as a means of influencing consumer behavior (e.g., influencing consumers to buy a particular product or service), identify specific advertising techniques, increase the ability to analyze and interpret ads, and formulate counterarguments to common advertising appeals. Another unit is designed to provide students with skills for coping with stress and anxiety (e.g., relaxation training, deep breathing), as well as emotional self-regulation skills designed to manage feelings of anger/frustration (e.g., inhibiting impulsive reactions, reframing, using positive self-statements).

A final unit in the personal competence component is designed to provide students with the basic principles of personal behavior change and a general approach to self-improvement (e.g., self-assessment, goal setting, self-monitoring, self-reinforcement). Students identify something they would like to improve that is measurable and achievable before the end of the program (i.e., usually the end of the semester), set a realistic goal, break that goal down into a series of subgoals, work toward achieving

their goal, and use self-monitoring to assess progress and self-reinforcement to reward success. Examples of typical items selected for self-improvement include losing weight, improving grades, becoming more physically fit, improving musical or athletic skills, and improving family relationships.

Social Competence

The social competence component teaches an important set of social skills in an effort to promote overall social competence. One unit focuses on teaching general communication skills so that students learn to communicate clearly and avoid misunderstandings. Some of the material taught involves recognizing the importance of nonverbal communication, maintaining consistency between verbal and nonverbal channels of communication, learning to be specific when giving instructions or making arrangements, and using paraphrasing as a way to ensure that students understand a message being communicated by someone else. Another unit within the social skills component focuses on overcoming shyness, initiating social interactions through common greetings, initiating brief social interactions, and teaching skills for meeting new people, making new friends, and developing healthy relationships. In another unit, students are taught complimenting skills (both giving and receiving compliments) and general conversational skills (i.e., techniques for starting, sustaining, and concluding a conversation). In a final unit, students are taught general assertiveness skills (e.g., skills for making requests, refusing unreasonable requests, and standing up for one's rights).

Drug Resistance

The drug resistance component teaches health information and skills designed to increase students' ability to resist social pressures to smoke cigarettes, drink alcohol, and use illicit drugs. Included in this component is material concerning (a) the adverse consequences of tobacco, alcohol, and illicit drug use; (b) the current prevalence of drug use among both youth and adults in order to correct or modify normative expectations about drug use; (c) the changing social acceptability of cigarette smoking and illicit drugs; and (d) the immediate physiological effects of cigarette smoking. In addition to

material in specific units relating to tobacco, alcohol, and drugs, material related to health topics is also integrated into other units of the program. For example, the unit focusing on media influences includes material concerning media pressures to smoke, drink, or use illicit drugs. Similarly, in the unit focusing on advertising, students are taught to identify and form counter-arguments to common advertising messages. Finally, students are taught the use of assertiveness skills to resist direct peer pressure to smoke cigarettes, drink alcohol, or use illicit drugs (these skills are framed as "defense of rights").

BOOSTER INTERVENTION

Results from school-based studies indicate that prevention effects often decay over time (Resnicow & Botvin, 1993). However, booster interventions can maintain and even enhance initial prevention effects (Botvin, Renick, & Baker, 1983). Therefore, the LST middle/junior high school program currently consists of a primary year of intervention (i.e., Grade 6 in middle school, Grade 7 in junior high school) and a booster intervention in the subsequent 2 years that is designed to reinforce material covered during the primary year of intervention. Correspondingly, the 15 sessions in the first year of LST are followed by 10 booster sessions in Year 2 and five booster sessions in Year 3. The booster sessions provide developmentally appropriate content that focuses on the continued development and reinforcement of personal self-management skills, general social skills, and drug refusal skills, with an emphasis on skills to help students cope effectively with the many pressures and problems they are likely to confront during the middle/junior high school years.

MATERIALS, DELIVERY METHODS, AND PROVIDER TRAINING

Curriculum Materials

The LST program is designed to be self-contained, easy to use, and engaging for students. In order to standardize the intervention and enhance fidelity, the program materials include a teacher's manual

and student guide for each year of the intervention. The teacher's manuals contain carefully designed and easy-to-follow lesson plans that provide developmentally appropriate content and activities for each class session. The student guides contain content and activities relating to class sessions and behavioral homework assignments. The material in the student guides is designed for use both in and out of class to reinforce material covered in the program and to help consolidate the skills taught and practiced in the classroom. Capitalizing on feedback from both teachers and students, these materials have been refined and improved over the years to foster implementation fidelity and promote student engagement. These refinements involved improving the presentation of LST content and activities in the various program materials, rather than substantive changes to the underlying prevention strategy. The prevention program was also expanded over the years from its original focus on tobacco to one that includes content and activities related to alcohol, illicit drugs, and violence.

Delivery Methods

Several different intervention methods are used to implement the LST program, with an emphasis on interactive techniques. These include the use of traditional didactic teaching methods, facilitation and group discussion, classroom demonstrations, and cognitive-behavioral skills training. While lecturing and conventional didactic teaching methods are appropriate for some of the material in the LST program, much of the material can be taught most effectively using interactive methods such as facilitating group discussions and skills training, with skills training being the primary intervention method. Since a major emphasis of the LST program is on the teaching of general personal self-management skills, social skills, and skills for resisting social influences to use drugs, the central role of teachers and other program providers is that of a skills trainer or coach. The LST cognitive-behavioral skills-training approach consists of instruction, demonstration, behavioral rehearsal (i.e., practice), feedback, social reinforcement (e.g., praise), and extended practice in the form of behavioral homework assignments.

Provider Training

Provider training typically consists of a 1- or 2-day training workshop and is delivered by a national pool of certified trainers. The purpose of the training is to familiarize intervention providers with the prevention program content, materials, teaching methods, and underlying intervention theory. It also provides an opportunity for trainees to learn and practice the skills needed to successfully implement the prevention program. Research shows that different training formats (e.g., face-to-face workshops vs. packaged videotaped training) can produce comparable results (Botvin, Baker, Dusenbury, Botvin, & Diaz, 1995). Online training is becoming an increasingly popular alternative to conventional face-to-face workshops, especially for remote sites.

EVIDENCE OF EFFECTIVENESS

The LST approach to tobacco, alcohol, and illicit drug abuse prevention has been rigorously and extensively tested in a series of studies over more than three decades. These studies have been conducted in a logical sequence in order to develop and test the effectiveness of this prevention approach with different substance use behaviors, different types of program providers, different age groups, and different populations.

HISTORY AND OVERVIEW

LST was originally developed as a cigarette smoking prevention program and was tested with White middle-class students residing in suburban New York (Botvin & Eng, 1980). In this initial formulation, the program was designed to modify perceived tobacco use norms, decrease social influences to smoke cigarettes, and increase personal and social competence in an effort to address a number of important social and psychological factors related to the onset of cigarette smoking. Subsequent research tested this approach with other forms of substance use and other health-risk behaviors. LST has been tested when implemented using different delivery formats (e.g., weekly or multiple times per week), different program providers (e.g., teachers, health professionals, peer leaders), with different age

groups (i.e., elementary, middle/junior high, and high school students), and with different populations (i.e., suburban, urban, and rural populations; White, Black, and Hispanic youth). Research with the LST program has also tested its long-term durability; the effectiveness of booster sessions for maintaining and enhancing program effects; its impact on hypothesized mediating variables; and issues related to dissemination, adoption, implementation—particularly the importance of implementation fidelity, and sustainability.

Studies testing LST include both efficacy and effectiveness trials, and have ranged from small-scale pilot studies involving only a few schools and several hundred students to large-scale randomized controlled trials (RCTs) involving as many as 56 schools and nearly 6,000 students. These studies have varied in length from short- and intermediate-

term studies lasting from a few months to a few years to long-term studies lasting up to 12 years in our most recent follow-up. The compilation of studies shows not only that LST has an immediate impact on students who receive the program in middle/junior high school but also that these effects are durable and can last well into young adulthood.

Thus far, evidence for the effectiveness of LST has been documented by 32 outcome studies (involving 18 separate cohorts of students) published in peer-reviewed scientific journals. While the majority of these studies were conducted by investigators at Cornell University's Weill Medical College, studies conducted and published by other research groups provide independent evidence of LST's effectiveness. Table 10.1 summarizes the research designs, sample descriptions, and primary outcomes of these various studies.

TABLE 10.1

Studies Testing the Effects of Life Skills Training on Substance Use and Related Outcomes

Authors, year published, journal	Dataset/cohort ^a	Randomized trial	No. of schools	No. of LST sessions	Years of follow-up ^b	No. of students	Sampled description	Intervention effects
<i>Efficacy trials</i>								
Botvin et al., 1980, <i>Preventive Medicine</i>	1	●	2	10	0	281	W,S	S
Botvin et al., 1980, <i>The Journal of School Health</i>	1	●	2	10	.25	281	W,S	S
Botvin et al., 1982, <i>Preventive Medicine</i>	2	●	2	12	1	426	W,S	S
Botvin et al., 1983, <i>Journal of Behavioral Medicine</i>	3	●	7	15	1	902	W,S	S
Botvin, Baker, Renick, et al., 1984, <i>Addictive Behaviors</i>	4	●	10	20	0	1311	W,S	S,A,C
Botvin, Baker, Botvin, et al., 1984, <i>Journal of Studies on Alcohol</i>	5	●	2	20	1	239	W,U	A

(continued)

TABLE 10.1 (cont.)

Authors, year published, journal	Dataset/cohort ^a	Randomized trial	No. of schools	No. of LST sessions	Years of follow-up ^b	No. of students	Sampled description	Intervention effects
Botvin, Dusenbury, et al., 1989, <i>Journal of Behavioral Medicine</i>	6	●	8	15	0	471	M,U	S
Botvin, Batson, et al., 1989, <i>Public Health Reports</i>	7	●	9	12	0	608	M,U	S
Botvin, Baker, Dusenbury, et al., 1990, <i>Addictive Behaviors</i>	4	●	10	30	1	998	W,S	S,A,C
Botvin et al., 1992, <i>Health Psychology</i>	8	●	47	15	0	3153	M,U	S
Botvin et al., 1994, <i>Psychology of Addictive Behaviors</i>	9	●	6	15	0	639	M,U	
Botvin, Schinke, et al., 1995, <i>Psychology of Addictive Behaviors</i>	9	●	6	23	2	456	M,U	A
Botvin et al., 1997, <i>Journal of Child & Adolescent Substance Abuse</i>	10	●	7	30	0	721	M,U	S,A,C,I
Botvin et al., 2003, <i>Journal of Child & Adolescent Substance Abuse</i>	11	●	20	24	0	1090	W,S	S,A
Zollinger et al., 2003, <i>The Journal of School Health</i>	12		16	15	2	1598	M,U	S
<i>Effectiveness trials</i>								
Botvin, Baker, Dusenbury, et al., 1990, <i>Journal of Consulting and Clinical Psychology</i>	13	●	56	30	2	3684	W,S	S,A,C
Botvin et al., 1999, <i>JAMWA</i>	14	●	29	25	1	2209	M,U	S
Botvin et al., 2000, <i>Addictive Behaviors</i>	13	●	56	30	6	447	W,S	I
Botvin et al., 2001, <i>Prevention Science</i>	14	●	29	25	1	3621	M,U	S,A,I

TABLE 10.1 (cont.)

Authors, year published, journal	Dataset/cohort ^a	Randomized trial	No. of schools	No. of LST sessions	Years of follow-up ^b	No. of students	Sampled description	Intervention effects
Botvin et al., 2001, <i>Psychology of Addictive Behaviors</i>	14	●	29	25	2	3041	M,U	A
Scheier et al., 2001, <i>Prevention Science</i>	13	●	56	30	5	2288	W,S	S,A,C,I
Spoth et al., 2002, <i>Psychology of Addictive Behaviors</i> ^c	15	●	24	30	1	1115	W,R	C,I
Griffin et al., 2003, <i>Preventive Medicine</i>	14	●	29	25	1	758	M,U	S,A
Trudeau et al., 2003, <i>Prevention Science</i>	15	●	24	30	1.5	847	W,R	S,A,C
Fraguela et al., 2003, <i>Psychology in Spain</i>	16	●	5	16	4	1029	W,U	S,A,C,I
Griffin et al., 2004, <i>Prevention Science</i>	13	●	56	30	6	2042	W,S	R
Spoth et al., 2005, <i>Psychology of Addictive Behaviors</i> ^b	17	●	36	15	2	1109	W,R	A,C,I
Spoth et al., 2006, <i>Archives of Pediatrics & Adolescent Medicine</i> ^b	17	●	36	20	5.5	398	W,R	I
Griffin et al., 2006, <i>Prevention Science</i>	13	●	56	30	6	2042	W,S	H
Botvin et al., 2006, <i>Prevention Science</i>	18	●	41	18	0	4858	W,U	V,D
Spoth et al., 2008, <i>Drug Alcohol Depend</i> ^b	17	●	36	20	5.5	398	W,R	I

Note. M = Predominantly Minority; W = Predominantly White; U = Urban; S = Suburban; R = Rural; S = Smoking; A = Alcohol; C = Cannabis; I = Illicit Drugs Other Than Cannabis; V = Violence; D = Delinquency; R = Risky Driving; H = HIV Risk Behavior

^aPublications with same number represent studies on same cohort of students. ^bYears of follow-up after posttest assessment.

^cResults presented are for LST only vs. control condition.

RESEARCH METHODS

All of the LST studies conducted at Cornell University were RCTs, with schools being randomly assigned to experimental or control conditions. This methodology affords strict controls for potential biases, such as contamination across conditions and other threats to internal validity. In the large-scale randomized trials, schools were blocked on relevant covariates (e.g., cigarette smoking rates, reading levels, percent receiving school lunch, racial/ethnic composition) prior to random assignment in order to increase pretest equivalence and improve analytic precision (Murray, 1998). Students in the experimental condition received the LST program, while students in the control condition received no experimental manipulation (in some early studies) or “treatment as usual” (in more recent studies in which students received the drug education programs normally provided by their schools).

Students were typically pretested and posttested by self-report questionnaires designed to collect data on demographic characteristics, substance use, and hypothesized mediating variables associated with substance use risk. Survey questionnaires were tested for reliability and validity, and shown to have good psychometric properties. Data collection and program implementation were standardized using detailed research protocols to protect against potential threats to internal validity. Particular attention was placed on procedures to enhance the validity of self-report data. For example, biochemical indicators of behavior (i.e., expired air or saliva) were collected simultaneously using bogus pipeline procedures to enhance the validity of self-reports (Evans, Hansen, & Mittlemark, 1977). In addition, data collectors with racial and ethnic backgrounds similar to the study participants were recruited and trained using standardized protocols to ensure high-quality data collection. Carefully developed procedures were used to track study participants in order to maintain the highest possible sample retention rates and to reduce attrition. Moreover, attrition analyses were conducted in all large-scale randomized trials to rule out the possibility of sample bias due to differential attrition (by experimental condition and prior risk status). Data from these studies were analyzed using

well-accepted statistical methods for preventive intervention evaluations. Most studies used multivariate techniques that adjust for relevant covariates to improve model precision. To account for school-level clustering in large-scale effectiveness trials, data were analyzed either at the school level or involved statistical techniques controlling for clustering effects. As a whole, this body of research provides clear and consistent evidence that the LST approach can decrease tobacco, alcohol, drug use, and other health-risk behaviors.

EFFICACY TRIALS

Studies testing LST found that the program can reduce the proportion of tobacco, alcohol, and marijuana users by about 50% and, in some cases, by as much as 80%. The early studies testing LST demonstrated its efficacy as a cigarette smoking prevention program (Botvin & Eng, 1982; Botvin, Eng, & Williams, 1980). Subsequent studies found prevention effects for the use of alcoholic beverages (Botvin, Baker, Botvin, Filazzola, & Millman, 1984; Botvin, Baker, Renick, Filazzola, & Botvin, 1984) and/or marijuana (Botvin, Baker, Renick, et al., 1984). In addition, research showed that booster sessions could maintain and, in some cases, even enhance initial prevention effects (Botvin et al., 1983). With respect to program providers, the LST approach was shown to be effective when implemented by outside health professionals (Botvin, Eng, & Williams, 1980), peer leaders (Botvin & Eng, 1982), or classroom teachers (Botvin et al., 1983).

A series of RCTs tested LST with predominantly African American and Hispanic students from urban junior high schools. Similar to earlier LST research initiatives, the initial intent was to determine the program's efficacy for preventing cigarette smoking. Two studies found that LST prevented cigarette smoking among Hispanic junior high school students (Botvin, Dusenbury, Baker, James-Ortiz, Botvin, & Kerner, 1992; Botvin, Dusenbury, Baker, James-Ortiz, & Kerner, 1989). Another study demonstrated the efficacy of LST with a sample of African American youth (Botvin, Batson, et al., 1989). In addition, a study testing both culturally focused and generic versions of LST in a population

of inner-city, multiethnic minority youth found that while both conditions were effective, the culturally focused version produced stronger prevention effects with respect to the frequency and amount of alcohol use (Botvin, Schinke, Epstein, & Diaz, 1994; Botvin, Schinke, Epstein, Diaz, & Botvin, 1995). Further research testing the efficacy of LST with inner-city minority youth found that it reduced use of tobacco, alcohol, marijuana, and multiple drugs (Botvin, Epstein, Baker, Diaz, & Ifill-Williams, 1997). Taken together, these studies show that LST works well with multiple populations including White, African American, and Hispanic youth, and that tailoring it to specific populations can increase the program's efficacy.

EFFECTIVENESS TRIALS

The LST program also has been tested in several large-scale, group-randomized effectiveness trials, with the school as the unit of assignment to experimental conditions. These studies were designed to be methodologically rigorous and to provide important data concerning the short- and long-term effectiveness of LST on tobacco, alcohol, and drug use; its impact on more serious levels of drug involvement; and whether the program works in the hypothesized manner by modifying targeted risk factors associated with change in behavior.

The largest randomized trial involved 56 schools in New York State randomly assigned to one of three conditions: (a) LST and live (in-person) teacher training workshops, (b) LST and videotaped teacher training, and (c) treatment-as-usual control condition. For schools assigned to the two experimental treatment conditions, students receive the LST program in the seventh grade with booster sessions in the eighth and ninth grades. Students were pretested and posttested in the seventh grade with annual follow-up assessments. Initial results at the end of junior high school showed that students who received LST had significantly less cigarette smoking, alcohol abuse (i.e., drunkenness), and marijuana use (Botvin, Baker, et al., 1990). Five-year follow-up data collected at the end of high school showed similar results (Botvin, Baker, et al., 1995).

Several hypotheses were tested in this study: (a) live (in-person) teacher-training workshops would produce stronger prevention effects than packaged (videotaped) teacher training; (b) prevention effects would last until the end of high school; (c) targeting early-stage drug use would reduce one or more forms of more serious (i.e., later-stage) drug use, such as heavy (e.g., pack-a-day) cigarette smoking, heavy (e.g., binge) drinking, drunkenness, and multiple (i.e., polydrug) use; and (d) higher implementation fidelity would yield stronger prevention effects. The first three hypotheses were tested using data from the full follow-up sample. Furthermore, since no differences were found for the two teacher training conditions, they were combined for all subsequent analyses. The fourth hypothesis was tested using a high fidelity subsample, which was operationally defined as students who received 60% or more of the prevention program based on classroom observations of teacher implementation fidelity.

Analyses of data from the full follow-up sample of 3,597 students found that LST students had significantly lower rates of cigarette smoking, alcohol abuse (i.e., drunkenness), and polydrug use (i.e., tobacco, alcohol, and marijuana) than controls. The strongest prevention effects were found when implementation fidelity was taken into account. Analyses of data from the high-fidelity sample indicated that LST students had significantly lower rates of substance use than controls on nearly every measure of tobacco, alcohol, marijuana, and polydrug use. Virtually all of the statistical comparisons between the LST students and the controls were significant, and the effects were larger for students in the high-fidelity sample. Additional follow-up data were collected 6 months later (after high school) from a random sample of students. Students were mailed a follow-up survey to assess illicit drug use. Results found that, relative to controls, students who participated in the LST program during middle/junior high school had lower rates of illicit drug use overall and lower rates of hallucinogen, heroin, and narcotic use (Botvin, Griffin, Diaz, Scheier, Williams, & Epstein, 2000).

A second large-scale, randomized trial was conducted with inner-city, minority youth attending 29 New York City middle/junior high schools. In

order to ensure that LST was culturally appropriate for the target audience, the program materials were adapted in several ways. The Teacher's Manual and Student Guide were modified to include (a) relevant graphics and illustrations of minority youth; (b) language and reading levels of materials appropriate for the target population; (c) role-play scenarios adapted to best reflect the lives of minority youth; and (d) materials that were focus-group-tested with teachers, parents, and students from the participating communities. Posttest and 1-year follow-up results indicated that students who received the LST program reported less cigarette smoking, alcohol use, inhalant use, and polydrug use relative to controls (Botvin, Griffin, Diaz, & Ifill-Williams, 2001a). Additional analyses showed that LST reduced binge drinking (i.e., five or more drinks per drinking occasion) by 50% or more at the 1-year and 2-year follow-up assessments (Botvin, Griffin, Diaz, & Ifill-Williams, 2001b). Furthermore, analysis of data from a subsample of high-risk youth (i.e., students with poor academic performance and drug-using friends) who received the LST program were less likely than controls to engage in cigarette smoking, drinking, inhalant use, or polydrug use (Griffin, Botvin, Nichols, & Doyle, 2003).

LONG-TERM EFFECTIVENESS: 12-YEAR FOLLOW-UP

Twelve-year follow-up data were collected from the longitudinal sample of 3,597 students described above (Botvin, Baker, et al., 1995). Tracking procedures used to locate students from the original study included directory assistance searches, telephone matching services, Department of Motor Vehicles databases, mailings with address correction requests, and searches of spider-linked credit databases. After obtaining confirmed addresses on more than half of the original sample, follow-up surveys were mailed and completed surveys obtained on over 2,200 students. Several analyses were conducted to determine the comparability of the final follow-up sample by condition. First, the follow-up sample was tested to determine its comparability by condition in terms of demographic characteristics, pretest substance use, and academic performance (i.e., grades). Second,

the follow-up sample was examined in terms of marital or cohabitation status, college graduation rates, and income status. Third, analyses were conducted to test for differential attrition by experimental condition. No significant differences were found for any of these analyses. Moreover, the final young adult follow-up sample was approximately half male and half female, with an average age of 24. Significant intervention effects were found for several measures of substance use, including overall illicit drug use, marijuana use, nonmedical pill use, and tranquilizer use (Botvin & Griffin, 2012). The results of this follow-up study demonstrate the long-term effectiveness of LST in a sample of young adults who received LST during middle/junior high school.

INDEPENDENT EVIDENCE

Although much of the research testing LST has been conducted by our research team at Cornell, several independent studies by other research groups have provided additional evidence for the effectiveness of LST. In a series of RCTs, Spoth and his colleagues tested LST in a large-scale effectiveness trial involving Iowa youth. The first of these studies tested the effectiveness of a school-based prevention program (LST) alone and in combination with a family-focused prevention program. While there were significant prevention effects for both conditions, there were stronger effects for the condition with both LST and the family-focused intervention (Spoth, Redmond, Trudeau, & Shin, 2002). Interestingly, there were also significant prevention effects for marijuana use 1 year after the end of the intervention for the group receiving only the LST program when compared with the control group.

In a follow-up study measuring students substance use 6 months later, students who received the LST program reported slower growth in substance use initiation (measured by rates of smoking, drinking, and marijuana use) relative to controls (Trudeau, Spoth, Lillehoj, Redmond, & Wickrama, 2003). In a third study conducted by Spoth and colleagues, the long-term impact of LST was assessed both alone and in combination with a family-focused prevention program. The researchers found decreased rates of methamphetamine

use for both conditions (relative to controls) at the 4.5- and 5.5-year follow-ups (Spoth, Clair, Shin, & Redmond, 2006).

In another independent study conducted with 1,598 students in Grades 6 to 8, Zollinger, Saywell, Muegge, Wooldridge, Cummings, and Caine (2003) found lower rates of cigarette smoking and greater intentions to remain smoke-free for students who received LST relative to controls who did not. Finally, researchers in Spain conducted a 4-year longitudinal study involving 1,029 students from five secondary schools. Prevention effects were found first for cigarette smoking and alcohol use, followed later by prevention effects for the use of cannabis, tranquilizers, and amphetamines (Fraguela, Martin, & Trinanes, 2003).

In sum, there is a substantial literature involving methodologically rigorous, well-executed studies testing the effectiveness of LST—some conducted by researchers at Cornell and others conducted by independent investigators. Together, these studies provide consistent evidence of LST's effectiveness with White, African American, and Hispanic/Latino youth as well as with suburban, urban, and rural youth. Of the published studies testing LST listed in Table 10.1, there are 20 studies showing that the program decreases tobacco use, 15 studies showing that it decreases alcohol use, 10 studies showing that it decreases marijuana use, and 10 studies showing that it produces significant reductions in illicit drug use other than marijuana.

MEDIATING AND MODERATING MECHANISMS

A series of studies examined the links between substance use outcomes and key hypothesized mediators and moderators outlined in the LST conceptual model. Below is a brief review of findings that support specific pathways of the LST conceptual model, first from an etiologic perspective and then from an intervention perspective.

Personal Competence Skills

A number of etiology studies focused on the protective role that personal self-management skills—including decision making, problem solving,

behavioral self-control, and self-reinforcement—may play in terms of adolescent substance use. In two studies using latent growth modeling, the protective effects of self-management skills were examined longitudinally over the course of middle school and high school. Findings indicated that early self-management skills slowed growth in substance use (i.e., alcohol, cigarettes, and marijuana) over time, and that increases in self-management skills were inversely related to growth in substance use over time (Griffin, Scheier, & Botvin, 2009; Lowe, Acevedo, Griffin, & Botvin, 2013).

Several studies examined the mediating mechanisms through which personal self-management skills are protective. These skills had a direct protective effect on later substance use, and this protective effect was fully mediated by greater psychological well-being but not psychological distress (Griffin, Botvin, Scheier, Epstein, & Diaz, 2002; Griffin, Scheier, Botvin, & Diaz, 2001). These findings support the LST conceptual model by suggesting that personal competence during early adolescence reflects an underlying psychosocial resiliency in which youth with better self-management skills experience greater levels of well-being that reduces substance use involvement. Other studies have identified moderating effects where self-management skills (including decision-making and self-reinforcement skills) buffered the impact of negative social influences such as prodrug attitudes and behaviors among peers and parents (Botvin, Malgady, Griffin, Scheier, & Epstein, 1998). These findings provide further support for the intervention model.

Social Competence and Drug Resistance Skills

Other studies illustrate the mediating mechanisms through which social competence skills can protect young people from substance use. For example, one study found that students who were more socially confident, assertive, and had better communication skills reported less cigarette smoking and drinking; this direct effect was fully mediated by higher expectancies of social benefits arising from drug use (Griffin, Epstein, Botvin, & Spoth, 2001). These findings support the conceptual intervention model by showing that youth lacking competence

skills may engage in substance use in an attempt to achieve increased social status or other perceived social benefits.

While drug refusal skills can have direct protective effects on substance use, an individual's ability to utilize refusal skills may stem from a variety of factors. General competencies in areas such as decision-making skills and perceived self-efficacy enhance adolescents ability to draw upon specific drug refusal skills (Epstein, Griffin, & Botvin, 2000a, 2000b, 2000c) and media resistance skills (Epstein & Botvin, 2008). Moreover, a study using latent growth modeling to analyze 4-year longitudinal data provided support for a dual process model indicating that growth in poor refusal skills and personal self-control skills was paralleled by increasing rates of alcohol involvement (Scheier, Botvin, Griffin, & Diaz, 1999).

Finally, studies have identified moderating effects where drug refusal skills buffer the impact of negative social influences associated with drug use. Among youth with friends that drink alcohol, those who engaged in less frequent use of refusal skills were at greater risk for future drinking than youth who engaged in more frequent use of refusal skills (Epstein & Botvin, 2002; Epstein, Zhou, Bang, & Botvin, 2007). Taken together, these findings support the LST intervention model by showing that drug refusal skills and related competencies can offset perceived and actual prodrug influences in the social environment.

Intervention Effects on Hypothesized Mediators

In addition to etiology studies testing the conceptual model, intervention studies have examined the impact of LST on hypothesized mediators. In studies focusing on cigarette smoking prevention, intervention effects were observed on hypothesized mediators including antismoking knowledge (Botvin & Eng, 1982; Botvin, Batson, et al., 1989; Botvin, Dusenbury, et al., 1989; Botvin et al., 1983, 1992; Zollinger et al., 2003), perceived peer and/or adult smoking norms (Botvin, Baker, et al., 1990; Botvin, Dusenbury, et al., 1989; Botvin et al., 1992), cigarette smoking refusal skills and smoking intentions (Zollinger et al., 2003), decision making (Botvin,

Batson, et al., 1989), assertiveness and self-esteem (Botvin et al., 1983), and social anxiety (Botvin & Eng, 1980, 1982; Botvin et al., 1983).

In the studies focusing more broadly on substance use, intervention effects were observed on hypothesized mediators, including antidrug knowledge (Botvin, Baker, Dusenbury, et al., 1990; Botvin, Baker, Renick, et al., 1984; Botvin, Schinke, et al., 1995; Botvin et al., 2001b, 2003), antidrug attitudes (Botvin, Baker, Botvin, et al., 1984; Botvin, Baker, Filazzola, et al., 1990; Botvin et al., 2001b, 2003), perceived peer and/or adult drug use norms (Botvin, Baker, Dusenbury, et al., 1990; Botvin et al., 2001b, 2003), drug refusal skills (Trudeau et al., 2003), locus of control (Botvin, Baker, Dusenbury, et al., 1990; Botvin, Baker, Renick, et al., 1984), risk taking (Botvin, Schinke, et al., 1995), and self-esteem (Botvin, Baker, Renick, et al., 1984; Botvin et al., 2003).

Direct Tests of Mediating Mechanisms

Several studies provided a direct test of mediation using the statistical criteria outlined by Baron and Kenny (1986). Studies examining the mediating mechanisms of the LST program can be grouped into those focused on the impact of LST on cigarette smoking and those focused on the impact of LST on substance use more broadly. The former studies found that the intervention prevents smoking through its effect on smoking knowledge, perceived peer and/or adult smoking norms (Botvin et al., 1992, 1999), and refusal skills, smoking intentions, and risk taking (Botvin et al., 1999). Studies testing mediation of LST on substance use showed that the intervention prevents substance use through its effects on antidrug attitudes (Botvin et al., 1994; Botvin, Schinke, et al., 1995), peer normative expectations (Botvin et al., 1997, 2001a), drug refusal skills (Botvin et al., 1997), behavioral intentions (Botvin et al., 1994, 2001a), social competence (Scheier et al., 2001), and risk taking (Botvin et al., 1994, 1997, 2001a).

Implications for Theory

In summary, data from etiology and intervention studies provide support for the LST prevention model. The conceptual model posits that specific personal and social competence skills lead to

reduced drug use via a process that enhances psychosocial resilience. Adolescents with better competence skills are more effective in social interactions or achieve greater success in academic pursuits as well as other developmental tasks. These mastery experiences promote self-efficacy and expectations of future success, contributing to a sense of self-esteem and well-being. This process of resilience reduces vulnerability to negative social environmental influences such as prodrug social messages, media portrayals, adult role models, and peer influences. Likewise, it also may reduce internal motivational forces that promote drug use such as the desire to appear mature, rebellious, and independent. Because this resilience process involves a general set of social and self-management competencies, it offers the potential for preventing a variety of problem or health-risk behaviors that share a similar constellation of risk and protective factors. To the extent that these competence skills promote success in developmental tasks, they also would be expected to have the potential to promote positive youth development more broadly.

APPLICATION OF LST TO OTHER AGE GROUPS

Age-appropriate interventions using the LST approach were developed, tested, and proven to be effective with several different age groups. Although most research testing LST was conducted with middle/junior high school students, LST has also been tested with elementary school students and high school students. These interventions were designed to be used either alone or in combination with one another.

Elementary School

Since many of the same etiologic factors appear to play a role in promoting the onset of tobacco and alcohol use among younger populations (O'Loughlin, Paradis, Renaud, & Gomez, 1998), a reasonable hypothesis is that prevention approaches found effective with middle/junior high school students might also be effective with younger populations. Therefore, the LST program was adapted for upper elementary school students in Grades 3 through 5. The goal of the program was to reduce

tobacco and alcohol use. Similar to the LST middle-school program, the prevention program for elementary school students was designed to teach students the knowledge and skills necessary to resist social influences to use one or more substances, as well as to teach material designed to promote personal and social competence using interactive teaching methods. The LST elementary-school program consists of 24 classes (approximately 30 to 45 minutes each) designed to be taught over the course of 3 years at a rate of eight classes per year. The program materials and activities were intended for students in the last 3 years of elementary school (either Grades 3–5 or Grades 4–6). Results of a randomized trial involving 20 elementary schools and 1,097 students demonstrated the effectiveness of the LST program for preventing tobacco and alcohol use among elementary school students and also demonstrated the utility of intervening during the preadolescent years (Botvin, Griffin, Paul, & Macaulay, 2003).

High School

Two studies show that LST is also effective with high school students. These two studies involved students attending suburban schools in the ninth and 10th grades as well as some students in the eighth grade. In the initial study, participating students were pretested and posttested by self-report questionnaires probing their cigarette smoking, health knowledge, and several psychosocial variables (Botvin, Eng, & Williams, 1980). The intervention reduced cigarette smoking by 60% among ninth and 10th graders. A follow-up study collected data 3 months after the initial posttest to determine the stability of these findings. Overall, follow-up results indicated that the students who received the intervention continued to have significant and substantial reductions in smoking rates (Botvin & Eng, 1980). The LST materials for high school students have been updated and refined to make them more appealing to this age group.

WORKPLACE

The Life Skills Training Wellness Program (LST-WP) is an extension and adaptation of the LST approach suitable for the workplace. LST-WP is based on the

same theory, prevention approach, and methods of the school-based program. It is designed to provide comprehensive skills training for adolescent and young adult employees in many of the same key areas as the school-based program. LST-WP is an eight-session program that focuses on teaching self-management skills (e.g., goal setting in the workplace, problem solving in the workplace, stress and anger management), social skills (e.g., effective communication, conflict resolution), and work-life skills (e.g., time and money management, drug resistance skills, building a safe and drug-free workplace). LST-WP was tested in a 20-site randomized trial with a diverse sample of 16- to 24-year-old employees at a large supermarket chain (Williams, Samuolis, Griffin, & Botvin, 2011). Six-month and 18-month follow-up results indicated that employees who participated in the LST-WP program were 1.6 times more likely than controls to score high on job satisfaction and quality of work, and lower on health care utilization and symptoms of stress and depression.

BEYOND DRUG ABUSE PREVENTION

Multiple Health-Risk Behaviors

With the accumulation of evidence from different areas of research, it has become increasingly clear that many health-risk behaviors cluster together. Not only are these risk behaviors highly associated with one another, but many also share overlapping etiologic factors and a similar developmental course. As a consequence, the same individuals are often at risk for multiple health problems (Biglan, Brennan, Foster, & Holder, 2004). This suggests the exciting possibility that rather than developing separate preventive interventions for each of these various health-risk behaviors, a single prevention approach targeting these shared etiologic factors may have the potential for preventing or reducing risk for multiple health problems. For example, rather than developing and implementing separate programs, all competing for time and resources, a single intervention may prevent or reduce risk for a wide range of health-risk behaviors. In addition to the existing etiologic evidence and theoretical formulations, research with the LST indicates that it can have

favorable prevention effects on multiple health-risk behaviors. The evidence discussed in this chapter documents the effectiveness of LST for preventing the use/abuse of tobacco, alcohol, marijuana, and other illicit drugs. In addition, studies testing LST have also found that it can significantly reduce risky driving (Griffin, Botvin, & Nichols, 2004), violence and delinquency (Botvin, Griffin, & Nichols, 2006), and HIV/AIDS risk behaviors (Griffin, Botvin, & Nichols, 2006).

Academic Benefits

Academic performance is often adversely affected by drug use, violence, and other problem behaviors. Tobacco, alcohol, and illicit drug use are associated with lower academic performance, higher absenteeism, and higher dropout rates. Prevention programs that effectively deter or reduce drug use may also help students avoid the deleterious effects of drug use on academic performance and other educational outcomes. Similarly, competence-based prevention programs, such as LST, that are designed to teach a range of life skills may facilitate overall educational success. Information garnered from the fields of health, psychology, and education suggests that LST may have the potential for producing a positive impact on several key educational outcomes.

First, LST has the potential for improving school attendance, engagement, and commitment. LST can contribute to a sense of mastery that enhances school bonding by not only preventing problem behaviors but also by providing students with the requisite skills to be resilient and successful in the face of new challenges. Second, LST also offers the potential for improving school safety (e.g., by decreasing aggression and violence) and fostering the development of a supportive learning environment. Students who feel safe and secure are likely to be better able to learn and thrive at school. Third, LST can increase students' ability to handle academic pressures through the acquisition of problem-solving and decision-making skills, goal-setting and self-reinforcement skills, and skills for coping with stress and anxiety. Fourth, by teaching general social skills, LST can improve students' ability to interact with one another, work collaboratively with teachers and other students, and both request and provide

social support to and from peers. Fifth, LST teaches self-regulation, persistence, and management of emotions, which are necessary for effective classroom learning. Finally, LST provides students with the skills necessary to resist pressure from peers and the media to smoke, drink, or use drugs or engage in other health-risk behaviors. In addition, students are taught critical-thinking, decision-making and problem-solving skills, which can lead to making more appropriate health-related decisions. Together, these skills not only help students avoid the pitfalls of drug use and related problem behaviors, but also can provide students with the social and emotional skills needed to support academic success.

Economic Benefits

Tobacco, alcohol, and illicit drug abuse cost the United States over \$500 billion per year (Miller & Hendrie, 2008). As such, it is one of the most expensive health problems facing our nation. Nationwide implementation of effective prevention programs offers not only the potential for significantly reducing tobacco, alcohol, and drug abuse, along with the associated mortality and morbidity, but also the potential for considerable cost savings. Just as the effectiveness of different prevention approaches varies, so too do the potential economic benefits. Thus, in addition to conducting research to identify effective prevention approaches, it is also important that educators, health professionals, and policymakers become cognizant of the costs and potential economic benefits of different prevention approaches in order to make informed decisions about the allocation of increasingly scarce resources.

In addition to effectiveness, a useful metric for decision makers when comparing different programs or policy options is *cost-benefit*. Cost-benefit provides a means of assessing the cost savings that may accrue from financial expenditures on an effective tobacco, alcohol, or drug abuse prevention program (i.e., the return on investment). Cost-benefit is expressed as the ratio of expenditures to deliver a program (i.e., costs) and the social/economic savings monetized over time (i.e., benefits). Several recent cost-benefit analyses have been conducted to determine the potential cost savings of effective prevention programs. These studies show that effective prevention programs

are a good investment and that LST, in particular, can produce significant cost savings (Aos, Lieb, Mayfield, Miller, & Pennucci, 2004; Jones, Bumbarger, Greenberg, Greenwood, & Kyler, 2008). Moreover, a recent cost-benefit analysis found a \$38 benefit for every dollar spent on LST (Lee, Aos, Drake, Pennucci, Miller, & Anderson, 2012). Based on these cost-benefit analyses, it is evident that prevention is well worth the investment, and that LST can produce considerable cost savings. In view of the rapidly escalating costs of health care, it would be prudent for policymakers to place a much greater emphasis on promoting the use of prevention programs and policies that have been tested and proven effective.

SUMMARY AND CONCLUSIONS

Life Skills Training (LST) addresses a number of key etiologic factors using a theoretical framework derived from social learning theory and problem behavior theory. LST has been extensively tested in a series of randomized trials and found effective in preventing cigarette smoking, alcohol, and drug use as well as violence and other health-risk behaviors, such as risky driving. Research demonstrates that it is effective when delivered using different implementation formats, by different program providers, with different age groups, and with different populations. Follow-up studies conducted at the end of high school, after high school, and/or among young adults in their mid-20s support the long-term effectiveness of LST. Moreover, independent cost-benefit studies show that LST produces a cost savings of as much as \$38 for every dollar invested. Finally, LST offers the potential for reducing other health-risk behaviors and improving educational outcomes.

The growing availability of effective prevention programs has resulted in new tools for transforming prevention practice, improving public health, and reducing health care costs. Yet, funding for prevention has declined precipitously in recent years, putting the fruits of three decades of prevention research at risk. Given the rapidly escalating costs of health care, it is crucial that policymakers significantly increase funding for prevention and vigorously promote the use of programs and policies that have been tested and proven effective.

References

- Aos, S., Lieb, R., Mayfield, J., Miller, M., & Pennucci, A. (2004). *Benefits and costs of prevention and early intervention programs for youth*. Olympia, WA: Washington State Institute for Public Policy.
- Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.
- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173–1182. doi:10.1037/0022-3514.51.6.1173
- Biglan, A., Brennan, P. A., Foster, S. L., & Holder, H. D. (2004). *Helping adolescents at risk: Prevention of multiple problem behaviors*. New York, NY: Guilford.
- Botvin, G. J. (2000). Preventing drug abuse in schools: Social and competence enhancement approaches targeting individual-level etiological factors. *Addictive Behaviors*, 25, 887–897. doi:10.1016/S0306-4603(00)00119-2
- Botvin, G. J., Baker, E., Botvin, E. M., Filazzola, A. D., & Millman, R. B. (1984). Prevention of alcohol misuse through the development of personal and social competence: A pilot study. *Journal of Studies on Alcohol*, 45, 550–552.
- Botvin, G. J., Baker, E., Dusenbury, L., Botvin, E. M., & Diaz, T. (1995). Long-term follow-up results of a randomized drug abuse prevention trial in a White middle-class population. *JAMA*, 273, 1106–1112. doi:10.1001/jama.1995.03520380042033
- Botvin, G. J., Baker, E., Dusenbury, L., Tortu, S., & Botvin, E. M. (1990). Preventing adolescent drug abuse through a multimodal cognitive-behavioral approach: Results of a three-year study. *Journal of Consulting and Clinical Psychology*, 58, 437–446. doi:10.1037/0022-006X.58.4.437
- Botvin, G. J., Baker, E., Filazzola, A., & Botvin, E. M. (1990). A cognitive-behavioral approach to substance abuse prevention: A one-year follow-up. *Addictive Behaviors*, 15, 47–63. doi:10.1016/0306-4603(90)90006-J
- Botvin, G. J., Baker, E., Renick, N., Filazzola, A. D., & Botvin, E. M. (1984). A cognitive-behavioral approach to substance abuse prevention. *Addictive Behaviors*, 9, 137–147. doi:10.1016/0306-4603(84)90051-0
- Botvin, G. J., Batson, H., Witts-Vitale, S., Bess, V., Baker, E., & Dusenbury, L. (1989). A psychosocial approach to smoking prevention for urban black youth. *Public Health Reports*, 104, 573–582.
- Botvin, G. J., Dusenbury, L., Baker, E., James-Ortiz, S., Botvin, E. M., & Kerner, J. (1992). Smoking prevention among urban minority youth: Assessing effects on outcome and mediating variables. *Health Psychology*, 11, 290–299. doi:10.1037/0278-6133.11.5.290
- Botvin, G. J., Dusenbury, L., Baker, E., James-Ortiz, S., & Kerner, J. (1989). A skills training approach to smoking prevention among Hispanic youth. *Journal of Behavioral Medicine*, 12, 279–296. doi:10.1007/BF00844872
- Botvin, G. J., & Eng, A. (1980). A comprehensive school-based smoking prevention program. *The Journal of School Health*, 50, 209–213. doi:10.1111/j.1746-1561.1980.tb07378.x
- Botvin, G. J., & Eng, A. (1982). The efficacy of a multi-component approach to the prevention of cigarette smoking. *Preventive Medicine*, 11, 199–211. doi:10.1016/0091-7435(82)90018-4
- Botvin, G. J., Eng, A., & Williams, C. L. (1980). Preventing the onset of cigarette smoking through life skills training. *Preventive Medicine*, 9, 135–143. doi:10.1016/0091-7435(80)90064-X
- Botvin, G. J., Epstein, J. A., Baker, E., Diaz, T., & Ifill-Williams, M. (1997). School-based drug abuse prevention with inner-city minority youth. *Journal of Child & Adolescent Substance Abuse*, 6, 5–19. doi:10.1300/J029v06n01_02
- Botvin, G. J., & Griffin, K. W. (2012, April). *Long-term outcomes from Blueprints model programs: Life Skills Training*. Paper presented at 2012 Blueprints for Violence Prevention conference, San Antonio, Texas.
- Botvin, G. J., Griffin, K. W., Diaz, T., & Ifill-Williams, M. (2001a). Drug abuse prevention among minority adolescents: One-year follow-up of a school-based preventive intervention. *Prevention Science*, 2, 1–13. doi:10.1023/A:1010025311161
- Botvin, G. J., Griffin, K. W., Diaz, T., & Ifill-Williams, M. (2001b). Preventing binge drinking during early adolescence: One- and two-year follow-up of a school-based preventive intervention. *Psychology of Addictive Behaviors*, 15, 360–365. doi:10.1037/0893-164X.15.4.360
- Botvin, G. J., Griffin, K. W., Diaz, T., Miller, N., & Ifill-Williams, M. (1999). Smoking initiation and escalation in early adolescent girls: One-year follow-up of a school-based prevention intervention for minority youth. *Journal of the American Medical Women's Association*, 54, 139–143.
- Botvin, G. J., Griffin, K. W., Diaz, T., Scheier, L. M., Williams, C., & Epstein, J. A. (2000). Preventing illicit drug use in adolescents: Long-term follow-up data from a randomized control trial of a school population. *Addictive Behaviors*, 25, 769–774. doi:10.1016/S0306-4603(99)00050-7
- Botvin, G. J., Griffin, K. W., & Nichols, T. R. (2006). Preventing youth violence and delinquency through a universal school-based prevention approach. *Prevention Science*, 7, 403–408. doi:10.1007/s11221-006-0057-y

- Botvin, G. J., Griffin, K. W., Paul, E., & Macaulay, A. P. (2003). Preventing tobacco and alcohol use among elementary school students through Life Skills Training. *Journal of Child & Adolescent Substance Abuse, 12*, 1–17. doi:10.1300/J029v12n04_01
- Botvin, G. J., Malgady, R. G., Griffin, K. W., Scheier, L. M., & Epstein, J. A. (1998). Alcohol and marijuana use among rural youth: Interaction of social and intra-personal influences. *Addictive Behaviors, 23*, 379–387. doi:10.1016/S0306-4603(98)00006-9
- Botvin, G. J., Renick, N. L., & Baker, E. (1983). The effects of scheduling format and booster sessions on a broad-spectrum psychosocial smoking prevention program. *Journal of Behavioral Medicine, 6*, 359–379. doi:10.1007/BF00846324
- Botvin, G. J., Schinke, S. P., Epstein, J. A., & Diaz, T. (1994). The effectiveness of culturally-focused & generic skills training approaches to alcohol and drug abuse prevention among minority youth. *Psychology of Addictive Behaviors, 8*, 116–127. doi:10.1037/0893-164X.8.2.116
- Botvin, G. J., Schinke, S. P., Epstein, J. A., Diaz, T., & Botvin, E. M. (1995). Effectiveness of culturally-focused and generic skills training approaches to alcohol and drug abuse prevention among minority adolescents: Two-Year follow-up results. *Psychology of Addictive Behaviors, 9*, 183–194. doi:10.1037/0893-164X.9.3.183
- Cicchetti, D., & Luthar, S. S. (1999). Developmental approaches to substance use and abuse. *Development and Psychopathology, 11*, 655–656. doi:10.1017/S0954579499002254
- Epstein, J. A., & Botvin, G. J. (2002). The moderating role of risk-taking and refusal assertiveness on social influences in alcohol use among inner-city adolescents. *Journal of Studies on Alcohol, 63*, 456–459.
- Epstein, J. A., & Botvin, G. J. (2008). Media resistance skills and drug skill refusal techniques: What is their relationship with alcohol use among inner-city adolescents? *Addictive Behaviors, 33*, 528–537. doi:10.1016/j.addbeh.2007.11.001
- Epstein, J. A., Griffin, K. W., & Botvin, G. J. (2000a). A model of smoking among inner-city adolescents: The role of personal competence and perceived benefits of smoking. *Preventive Medicine: An International Journal Devoted to Practice and Theory, 31*, 107–114. doi:10.1006/pmed.2000.0674
- Epstein, J. A., Griffin, K. W., & Botvin, G. J. (2000b). Competence skills help deter smoking among inner-city adolescents. *Tobacco Control, 9*, 33–39. doi:10.1136/tc.9.1.33
- Epstein, J. A., Griffin, K. W., & Botvin, G. J. (2000c). Role of general and specific competence skills in protecting inner-city adolescents from alcohol use. *Journal of Studies on Alcohol, 61*, 379–386.
- Epstein, J. A., Zhou, X. K., Bang, H., & Botvin, G. J. (2007). Do competence skills moderate the impact of social influences to drink and perceived social benefits of drinking on alcohol use among inner-city adolescents? *Prevention Science, 8*, 65–73. doi:10.1007/s11121-006-0054-1
- Evans, R. I., Hansen, W. B., and Mittlemark, M. B. (1977). Increasing the validity of self-reports of behavior in a smoking in children investigation. *Journal of Applied Psychology, 62*, 521–523.
- Flay, B. R. (1987). Social psychological approaches to smoking prevention: Review and recommendations. In W. B. Ward & P. D. Mullen (Eds.), *Advances in Health Education and Promotion, 2*, 121–180. Greenwich, CT: JAI Press.
- Fraguela, J. A., Martin, A. L., & Trinanes, E. A. (2003). Drug-abuse prevention in the school: Four-year follow-up of a programme. *Psychology in Spain, 7*, 29–38.
- Griffin, K. W., Botvin, G. J., & Nichols, T. R. (2004). Long-term follow-up effects of a school-based drug abuse prevention program on adolescent risky driving. *Prevention Science, 5*, 207–212. doi:10.1023/B:PREV.0000037643.78420.74
- Griffin, K. W., Botvin, G. J., & Nichols, T. R. (2006). Effects of a school-based drug abuse prevention program for adolescents on HIV risk behaviors in young adulthood. *Prevention Science, 7*, 103–112. doi:10.1007/s11121-006-0025-6
- Griffin, K. W., Botvin, G. J., Nichols, T. R., & Doyle, M. M. (2003). Effectiveness of a universal drug abuse prevention approach for youth at high risk for substance use initiation. *Preventive Medicine: An International Journal Devoted to Practice and Theory, 36*, 1–7. doi:10.1006/pmed.2002.1133
- Griffin, K. W., Botvin, G. J., Scheier, L. M., Epstein, J. A., & Diaz, T. (2002). Personal competence skills, distress, and well-being as determinants of substance use in a predominantly minority urban adolescent sample. *Prevention Science, 3*, 23–33. doi:10.1023/A:1014667209130
- Griffin, K. W., Epstein, J. A., Botvin, G. J., & Spoth, R. L. (2001). Social competence and substance use among rural youth: Mediating role of social benefit expectancies of use. *Journal of Youth and Adolescence, 30*, 485–498. doi:10.1023/A:1010449300990
- Griffin, K. W., Scheier, L. M., & Botvin, G. J. (2009). Developmental trajectories of self-management skills and adolescent substance use. *Salud y Drogas, 9*, 15–37.
- Griffin, K. W., Scheier, L. M., Botvin, G. J., & Diaz, T. (2001). The protective role of personal competence skills in adolescent substance use: Psychological well-being as a mediating factor.

- Psychology of Addictive Behaviors*, 15, 194–203. doi:10.1037/0893-164X.15.3.194
- Hawkins, J. D., Catalano, R. F., & Miller, J. Y. (1992). Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: Implications for substance abuse prevention. *Psychological Bulletin*, 112, 64–105. doi:10.1037/0033-2909.112.1.64
- Jessor, R., & Jessor, S. L. (1977). *Problem behavior and psychosocial development: a longitudinal study of youth*. New York, NY: Academic Press.
- Jones, D., Bumbarger, B., Greenberg, M., Greenwood, P., & Kyler, S. (2008). *The economic return on PCCD's research-based programs: A cost-benefit assessment of delinquency prevention in Pennsylvania*. University Park: Pennsylvania State University.
- Lee, S., Aos, S., Drake, E., Pennucci, A., Miller, M., & Anderson, L. (2012). *Return on investment: Evidence-based options to improve statewide outcomes, October 2012* (Document No. 12-04-1201). Olympia, WA: Washington State Institute for Public Policy.
- Lowe, S. R., Acevedo, B. P., Griffin, K. W., & Botvin, G. J. (2013). Longitudinal relationships between self-management skills and substance use in an urban sample of predominantly minority adolescents. *Journal of Drug Issues*, 43, 103–118. doi:10.1177/0022042612462221
- Miller, T., & Hendrie, D. (2008). *Substance abuse prevention dollars and cents: A cost-benefit analysis* (DHHS Pub. No. [SMA] 07-4298). Rockville, MD: Center for Substance Abuse Prevention, Substance Abuse and Mental Health Services Administration.
- Murray, D. M. (1998). *Design and analysis of group-randomized trials*. New York, NY: Oxford University Press.
- O'Loughlin, J., Paradis, G., Renaud, L., & Gomez, L. S. (1998). One-year predictors of smoking initiation and of continued smoking among elementary schoolchildren in multiethnic, low-income, inner-city neighborhoods. *Tobacco Control*, 7, 268–275. doi:10.1136/tc.7.3.268
- Resnicow, K., & Botvin, G. J. (1993). School-based substance use prevention programs: Why do effects decay? *Preventive Medicine: An International Journal Devoted to Practice and Theory*, 22, 484–490. doi:10.1006/pmed.1993.1039
- Scheier, L. M. (2010). *Handbook of drug use etiology: Theory, methods, and empirical findings*. Washington, DC: American Psychological Association.
- Scheier, L. M., Botvin, G. J., & Griffin, K. W. (2001). Preventive intervention effects on developmental progression in drug use: Structural equation modeling analyses using longitudinal data. *Prevention Science*, 2, 91–112. doi:10.1023/A:1011543730566
- Scheier, L. M., Botvin, G. J., Griffin, K. W., & Diaz, T. (1999). Latent growth models of drug refusal skills and adolescent alcohol use. *Journal of Alcohol and Drug Education*, 44, 21–48.
- Spoth, R. L., Clair, S., Shin, C., & Redmond, C. (2006). Long-term effects of universal preventative interventions on methamphetamine use among adolescents. *Archives of Pediatrics & Adolescent Medicine*, 160, 876–882. doi:10.1001/archpedi.160.9.876
- Spoth, R. L., Randall, G., Trudeau, L., Shin, C., & Redmond, C. (2008). Substance use outcomes 5 1/2 years past baseline for partnership-based, family school preventive interventions. *Drug and Alcohol Dependence*, 96, 57–68.
- Spoth, R., Randall, G. K., Shin, C., & Redmond, C. (2005). Randomized study of combined universal family and school preventive interventions: Patterns of long-term effects on initiation, regular use, and weekly drunkenness. *Psychology of Addictive Behaviors*, 19, 372–381.
- Spoth, R. L., Redmond, C., Trudeau, L., & Shin, C. (2002). Longitudinal substance initiation outcomes for a universal preventive intervention combining family and school programs. *Psychology of Addictive Behaviors*, 16, 129–134. doi:10.1037/0893-164X.16.2.129
- Tobler, N., & Stratton, H. (1997). Effectiveness of school based drug prevention programs: A meta-analysis of the research. *The Journal of Primary Prevention*, 18, 71–128. doi:10.1023/A:1024630205999
- Trudeau, L., Spoth, R. L., Lillehoj, C., Redmond, C., & Wickrama, K. (2003). Effects of a preventive intervention on adolescent substance use initiation, expectancies, and refusal intentions. *Prevention Science*, 4, 109–122. doi:10.1023/A:1022926332514
- Williams, C., Samuolis, J., Griffin, K. W., & Botvin, G. J. (2011). Life Skills Training Wellness Program: An application for young adults in supermarkets. In J. W. Bray, D. M. Galvin, & L. A. Cluff (Eds.), *Young adults in the workplace: A multisite initiative of substance use prevention programs* (RTI Press Publication No. BK-0005-1103; pp. 117–132). Research Triangle Park, NC.
- Zollinger, T. W., Saywell, R. M., Muegge, C. M., Wooldridge, J. S., Cummings, S. F., & Caine, V. A. (2003). Impact of the Life Skills Training curriculum on middle school students' tobacco use in Marion County, Indiana, 1997–2000. *The Journal of School Health*, 73, 338–346. doi:10.1111/j.1746-1561.2003.tb04190.x