CHAPTER 26

PREVENTION OF SUBSTANCE ABUSE

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Substance abuse is a serious public health problem that warrants the attention of clinical psychologists and other health professions because of its widespread nature and deleterious impact on individuals, families, communities, and the larger society. For individuals, substance abuse contributes to a variety of negative health and behavioral outcomes, such as unintentional injuries, traffic fatalities, sexual assault, interpersonal aggression, neurocognitive deficits, and psychiatric problems (Newcomb & Locke, 2005). Because of the costs related to crime, incarceration, drug enforcement, lost productivity, and treatment, it is estimated that the societal economic impact associated with substance use and abuse, including alcohol and nicotine products, is more than half a trillion dollars in the United States alone (Volkow & Li, 2005).

Treatment is an essential ingredient in efforts to combat the problem of substance abuse, but treatment can be expensive and labor intensive, and progress is often undermined by high recidivism rates. Moreover, it is estimated that fewer than 15% of individuals who develop a substance abuse problem receive treatment (Gerada, 2005). Given this reality, it is clear that an emphasis on treatment alone is not sufficient. Rather, a more comprehensive strategy is needed to effectively address the problem of substance abuse—a strategy that embraces a continuum-of-care perspective involving prevention as well as treatment and maintenance (Institute of Medicine, 1994).

A variety of health and mental health professionals are needed to provide comprehensive services across the continuum of care for substance abuse. In addition to their role as psychotherapists treating substance abuse, clinical psychologists can help combat the problem of substance abuse as prevention practitioners, researchers, and teachers. Furthermore, clinical psychologists can serve an important function as opinion leaders and authoritative sources of information in their communities concerning evidence-based prevention.

Early efforts to prevent substance abuse relied on providing information to educate individuals about the harmful effects of smoking, particularly in terms of increased risk for cancer, heart disease, stroke, and emphysema. Approaches to deter the use of alcohol have typically emphasized the adverse health, social, and legal consequences of use. These educational approaches have given way over the years to prevention approaches that place greater emphasis on psychosocial factors promoting substance use and abuse.

Considerable research conducted over the past 3 decades has tested the effectiveness of these approaches and provided strong empirical support for a growing body of evidence-based prevention approaches. The strongest evidence of effectiveness has been shown for comprehensive skills-building preventive interventions that address an array of shared psychosocial risk and protective factors associated with onset and escalation of substance use and related risk behaviors (such as aggression, delinquency, and school dropout).

Evidence suggesting that different problem behaviors stem from a set of common psychosocial

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risk and protective factors is consistent with the concept of an addiction syndrome—the notion that specific addictive behaviors or disorders are an outward expression of the same underlying shared developmental antecedents (Shaffer, 2012). Furthermore, some evidence-based substance abuse prevention programs that focus on skills building or competence enhancement have incorporated elements of cognitive–behavioral therapy. Instead of using these cognitive–behavioral skills in a clinical setting to remediate established disorders, they are taught in schools and other educational settings as proactive coping skills to enhance personal competence, reduce risk, and increase resilience.

In this chapter, we focus on educational and skills training preventive interventions for alcohol, tobacco, and other drugs, particularly programs that target individuals in school, family, and community settings. First, we briefly review the epidemiology of substance use disorders (SUDs). Because the majority of substance abuse prevention efforts focus on young people, we describe the typical developmental progression of use and abuse to inform the timing, content, and settings of prevention initiatives. Next, we review important risk and protective factors for substance abuse along with the primary theoretical conceptualizations that have guided the development of preventive interventions. After describing some initial ineffective strategies for prevention, we summarize the large body of research on what is effective in substance abuse prevention, including a review of major meta-analytic studies and systematic reviews that illustrate the characteristics of programs that work. Finally, we discuss future directions in substance abuse prevention research, theory, and practice.

DESCRIPTION AND DEFINITION

In the sections that follow, we provide descriptions and definitions of substance use, abuse, and dependence. We also discuss the age of onset and developmental progression of substance use as well as developmental factors influencing risk for engaging in substance use. Finally, we describe and define different types of prevention.

Substance Use, Abuse, and Dependence

The use of psychoactive substances progresses on a continuum ranging from initial onset and occasional use, to escalation in both frequency and amount, to more problematic patterns of use that may ultimately culminate in substance abuse and dependence. Interventions to prevent substance abuse are typically designed to reach individuals when they are either nonusers or early-stage users at the beginning of the developmental progression, well before the emergence of a full-blown SUD.

In the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (*DSM–5;* American Psychiatric Association, 2013), psychoactive SUDs include the use of alcohol; amphetamines; cannabis; cocaine; hallucinogens; inhalants; opioids; phencyclidine; sedatives, hypnotics, and anxiolytics; and polysubstances (use of more than one substance).

Historically, the *DSM* has differentiated between substance abuse and dependence. *Substance abuse* is characterized by a maladaptive pattern of psychoactive substance use that is recurrent despite significant impairment or distress and adverse consequences such as failure to fill major role obligations, continued use in hazardous situations, and recurrent legal, social, or interpersonal problems resulting from use. *Substance dependence* is a more serious level of abuse that is characterized by a number of cognitive, behavioral, and physiological symptoms combined with evidence of tolerance and withdrawal. *Tolerance* refers to a need for markedly increased amounts of the substance to achieve intoxication or the desired effect or markedly diminished effect with continued use of the same amount of the substance. *Withdrawal* is manifested by either withdrawal symptoms or the use of a psychoactive substance to avoid withdrawal symptoms, which vary by substance but may include increased heart rate, insomnia, fatigue, and irritability.

In the *DSM–5,* the distinction between abuse and dependence has been eliminated; there is now a single SUD diagnosis that is measured on a continuum from mild to moderate to severe, depending on the number of criteria met. The World Health Organization's (1992) *ICD–10 Classification of Mental and Behavioural Disorders* is used internationally for monitoring and surveillance, morbidity and

mortality statistics, and insurance reimbursement purposes. The *DSM–5* is considered to be fully compatible with *ICD–10* codes.

There have been a number of large-scale epidemiological studies on alcohol and SUDs in the United States and globally. In the general population of adults in the United States, annual prevalence rates of alcohol and substance use dependence were reported to be 12% and 2% to 3%, respectively (Merikangas & McClair, 2012). In an analysis of data from the National Survey on Drug Use and Health, rates of SUD were generally greater among men, Native Americans, adults ages 18 to 44, those of lower socioeconomic status, individuals residing in the western United States, and those who were never married or were widowed, separated, or divorced (Compton et al., 2007). National epidemiologic surveys have indicated that drug use disorders are strongly associated with alcohol use disorders as well as a variety of other mood, anxiety, and personality disorders (Compton et al., 2007).

In the most recent National Survey on Drug Use and Health survey (Substance Abuse and Mental Health Services Administration, 2014), the rate of substance dependence or abuse for respondents age 12 or older was 10.8% for males and 5.8% for females. However, among youths ages 12 to 17, the rate of substance dependence or abuse was equivalent among boys (5.3%) and girls (5.2%). A striking increase in prevalence rates of SUD is typically observed from during the years from early adolescence to young adulthood, demonstrating that adolescence is a key period for the development of SUDs.

From a global perspective, alcohol use disorder is more prevalent than illicit drug use disorder, and rates of disorder are higher among men than women, corresponding to patterns found in the United States. According to the World Health Organization (2010), the highest prevalence rates of alcohol use disorder are in Eastern and Central Europe (highest rates in Russia; 16.3% in men, 2.6% in women), the Western Pacific (highest rates in South Korea; 13.1% in men, 0.4% in women), the Americas (highest rates in Colombia; 10.3% in men, 2.6% in women), and Southeast Asia (highest rates in Thailand; 10.2% in men, 1.0% in women). Alcohol use disorders are much less prevalent in African and Eastern Mediterranean regions, in part because of religious and cultural restrictions. With respect to illicit drug use disorder, the highest prevalence rates are found in the Americas (as much as 4%) and in selected countries in the Eastern Mediterranean, Europe, and Western Pacific. However, many lower and middle income countries do not have national surveillance systems regarding the epidemiology of SUDs, making it difficult to precisely estimate prevalence rates.

Age of Onset and Progression

Substance abuse prevention initiatives are designed to be implemented before and during the key years of substance use onset, escalation, and peak levels of use. Therefore, it is important to understand the typical age of onset and developmental progression for substance use to determine the most appropriate timing for prevention initiatives.

The majority of adults who develop substance abuse disorders or problematic levels of use initially begin to use one or more psychoactive substances before adulthood. Research has shown that adults with substance abuse problems typically begin to use one or more substances during their adolescent years, and few individuals do so after their 20s (Chen & Kandel, 1995). Consequently, most substance abuse prevention efforts focus on children, adolescents, and young adults. An exception is workplace substance abuse prevention programs, which are often implemented as part of broader health promotion initiatives for employees of all ages.

Although trajectories of substance use and abuse vary considerably at the individual level, from a population perspective there is a typical developmental progression that describes how many people become involved with substance abuse. In addition to progressing from nonuse to increased frequency and amount of use, substance use also progresses from some substances to others. Generally, substance use starts with substances that are legal for adults and widely available, such as alcohol and tobacco (Komro et al., 2007). Wide availability also plays a role in the onset of other types of substance use among teens, including the use of inhalants

(glues, spray paints, deodorants, hair spray) and the nonmedical use of prescription drugs (pain killers, stimulants, tranquilizers) or over-the-counter medications (cough and cold medicines). Later, adolescents or young adults may begin to use substances that are illegal, less widely used, and more difficult to obtain, including marijuana, cocaine, hallucinogens, and other illicit drugs. Substances used at the beginning of this developmental progression are often referred to as gateway substances because these substances are used first and, in a statistical sense, often precede the use of other substances (Kandel, 2002). However, rather than being causal in nature, this progression can best be understood in terms of a risk paradigm: The use of any one substance increases the risk of using another, with one's risk of greater drug involvement increasing at each additional step in the developmental progression.

Given the typical developmental progression of substance use initiation, prevention programs designed for elementary and middle school students typically focus on alcohol and tobacco use. However, programs that are effective in preventing the use of these substances may also disrupt the developmental progression to other forms of substance use, including the use of other substances and the progression from occasional use to abuse and dependence.

Developmental Factors and Periods of Risk

Young people typically experiment with a wide range of behaviors and lifestyle patterns during adolescence as part of the process of developing a sense of identity and autonomy, separating from parents, gaining acceptance and popularity with peers, seeking fun and adventure, and rebelling against authority. As they begin to make independent decisions about their own health behaviors, including substance use, teenagers are influenced by a variety of societal messages, media portrayals, peer influences, and role models. Youths who are less successful in conventional pursuits and developmental tasks may be more vulnerable to the negative social influences that encourage substance use and other risk behaviors. In addition, many adolescents characteristically have a sense of invulnerability to danger (Hill, Duggan, & Lapsley, 2012), which may lead them to minimize the risks associated with substance use and overestimate their ability to avoid negative consequences. Indeed, brain imaging research has suggested that the areas of the adolescent brain critical for regulating behavior and controlling impulses continue to mature into early adulthood, and areas of the brain associated with social interaction and affective functioning are highly active among adolescents (Steinberg, 2008).

Furthermore, changes in cognitive development shift from concrete operational thinking, which is rigid and literal, to formal operational thinking, which is more relative, abstract, and hypothetical (Piaget, 1962). Formal operational thinking facilitates the discovery of inconsistencies or logical flaws in arguments made by parents and teachers. Thus, adolescents may formulate counterarguments to antidrug messages, which may lead to rationalizations for ignoring potential risks. This is particularly true if substance use is believed to have significant social or personal benefits. Thus, for a variety of reasons, simplistic approaches exhorting adolescents to just say no to drugs are not likely to be effective.

A great deal of research on substance abuse has focused on adolescents and young adults because the use of alcohol, tobacco, and other drugs typically begins during the early years of adolescence. However, a developmental perspective on substance use etiology and prevention is relevant throughout the life span. Prevalence rates for substance use typically peak during young adulthood, a time of new freedoms and relatively few responsibilities, and then begin to decline as young adults adopt new adult responsibilities related to career, relationships, or parenting (Bachman et al., 1997). Major life transitions that occur over the life span, such as starting or leaving school, entering or leaving a job, getting married or divorced, or becoming a parent, may be related to substance use or abuse because these events that can cause stress and test an individual's ability to adapt and self-regulate; they may expose an individual to new people and situations, and these affiliations can contribute to increases or decreases in substance use (Griffin, 2010).

Types of Prevention

Prevention has traditionally been classified along a spectrum consisting of primary, secondary, and tertiary prevention. Primary prevention is intended to target individuals before they have developed a disorder or disease. In the case of substance abuse, primary prevention efforts are designed for a general population of individuals who have not yet begun to smoke tobacco, drink alcohol, or use other drugs. The purpose of primary prevention approaches to substance abuse is to target the etiologic factors that research has identified as promoting or maintaining substance use.

Secondary prevention is intended to target individuals who are further along the developmental continuum and have already developed a particular disorder (e.g., already smoke cigarettes). Screening and early intervention are common secondary prevention approaches intended to identify and intervene early in the cycle of a disorder to prevent further progression.

Tertiary prevention is intended to target individuals who already have an established disorder in an effort to prevent it from progressing to the point of disability. A difficulty inherent in this classification system, particularly in the case of tertiary prevention, is that it does not adequately distinguish between prevention and treatment, because both types of activities involve the care of individuals with a well-established disorder.

The Institute of Medicine (Mrazek & Haggerty, 1994) proposed a new framework for classifying intervention programs on a continuum of care that includes prevention, treatment, and maintenance. In this framework, prevention is used to describe interventions that occur only before the onset of a disorder. Prevention is further divided into universal, selective, and indicated interventions. These categories are based on the populations to whom the interventions are directed. Universal prevention programs focus on the general population, aiming to deter or delay the onset of a risk behavior or medical condition. Selective prevention programs target selected subgroups of the population believed to be at high risk because of the presence of specific biological, social, psychological, or other risk factors. Selective interventions for substance abuse prevention might include pregnant women, children of drug users, or residents of high-risk neighborhoods, individuals who may have an elevated level of risk because of their membership in the selected group. Indicated prevention programs are designed for those already engaging in the behavior or showing early danger signs, or who are engaging in related high-risk behaviors. The Institute of Medicine framework has been widely adopted, and the terminology is now applied to substance abuse.

PRINCIPLES AND APPLICATIONS

Substance abuse prevention involves a variety of activities conducted in different settings and implemented by different types of providers. Research testing these approaches has led to the formulation of several key principles of prevention.

Substance Abuse Prevention Approaches

Substance abuse prevention consists of a variety of activities and intervention modalities. Some have taken the form of school assembly programs, classroom-based curricula, and family-based preventive interventions; others include mass media campaigns, public service announcements, and policy initiatives such as required health warning labels and minimum purchasing age requirements (Paglia & Room, 1999). Table 26.1 summarizes the major prevention modalities in substance abuse.

Information dissemination. One of the first approaches to prevent the use of tobacco, alcohol, and illicit drugs involved efforts to increase health knowledge and awareness of the adverse health, social, and legal consequences of using one or more of these substances. Prevention approaches using this approach include public information campaigns using printed and illustrated materials (e.g., pamphlets, posters, billboards, magazine ads) and public service announcements. Most prevention programs delivered in schools (often referred to as *tobacco education, alcohol education,* and *drug education*) are based on the information dissemination approach and include classroom curricula, educational films, or guest speakers such as law enforcement or health professionals. In addition to providing students with factual information about the adverse consequences

TABLE 26.1

Overview of Major Substance Abuse Preventive Approaches

Approach	Focus	Methods
Information dissemination	Increase knowledge of drugs and awareness of the adverse health, social, and legal consequences of drug use; promote antidrug use attitudes	Didactic instruction, discussion, audio and video presentations, displays of substances, posters, pamphlets, school assembly programs
Fear arousal	Arouse fear by highlighting dangers or harms of drug use through vivid descriptions of potentially severe negative consequences	Didactic instruction, discussion, vivid audio and video presentations, displays of substances, posters, pamphlets
Social influence approach	Increase awareness of social influences encouraging smoking, drinking alcohol, or using drugs that come from peers, adults, advertising, and the media (movies, television, music)	Class discussion; advertising and media analysis skills; use of same-age or older peer leaders
Resistance skills training	Develop skills for resisting substance use influences; refusal skills	Behavioral rehearsal; extended practice via behavioral homework
Normative education	Establish nonsubstance use norms; change the often inaccurate perception among youths that substance use is prevalent, socially acceptable, and harmless	Local or national surveys that show actual prevalence rates of substance use
Competence enhancement	Increase decision making, personal behavior change, anxiety reduction, communication, social and assertive skills; application of generic skills to resist substance use influences	Class discussion; cognitive–behavioral skills training (instruction, demonstration, practice, feedback, reinforcement)

of substance use, they also frequently educate students about the pharmacology of various psychoactive substances (often with an equal emphasis on positive and negative effects), street names for commonly abused illicit drugs, how the drugs are packaged and sold, and modes of administration.

Information dissemination approaches assume that substance use stems from insufficient knowledge of the adverse consequences of using these substances and that, once educated about the negative consequences, individuals will develop more negative attitudes about these behaviors and make a rational and logical decision not to smoke cigarettes, drink alcoholic beverages, or use marijuana and other psychoactive substances. Although informational approaches can increase knowledge and, in some cases, change attitudes regarding substance use, they fail when it comes to changing substance use intentions or behavior. Increased knowledge alone is not sufficient to change behavior. Even though the information dissemination approach to substance abuse prevention has not been demonstrated to decrease substance use, it continues to be widely used in many school, community, and media prevention initiatives.

Fear arousal. Closely related to information dissemination approaches are prevention approaches that rely on fear arousal methods. These approaches are often used in combination with information dissemination approaches and are intended to deter substance use by dramatizing the negative consequences of substance use in an effort to evoke fear in the target audience (often youths) and scare them into not smoking, drinking, or using drugs. Two common examples are school or media prevention efforts that rely on showing students graphic pictures of cancerous lungs (cigarette smoking) or auto fatalities resulting from drunk driving (alcohol). However, research in health communications has found that fear appeals used either alone or in combination with informational approaches are generally not effective in changing behavior, although these approaches may also contribute to change in attitudes.

Social influence approach. A major breakthrough in substance abuse prevention occurred as a result

of pioneering work by Richard Evans, a psychologist at the University of Houston. In a departure from approaches that relied on health knowledge, fear arousal, or both Evans (1976) focused instead on the social and psychological factors associated with the initiation of cigarette smoking. This research led to a new prevention paradigm that not only emphasized the importance of psychosocial factors but also emphasized developing and testing theory-based interventions using well-designed studies and rigorous research methods.

The approach developed by Evans (1976) was based on persuasive communications theory (McGuire, 1968) and the notion of "psychological inoculation." Similar to the concept of inoculation in the prevention of infectious disease, psychological inoculation was intended to expose students to persuasive communications designed to modify their attitudes, beliefs, and behavior. Psychological inoculation was intended to expose individuals to a weak dose of "germs" (persuasive messages from peers and the media) to stimulate the development of psychological "antibodies" (attitudes, beliefs, normative expectations) and thereby increase resistance to future exposure to persuasive messages in a stronger, more virulent form. Exposing adolescents to weak and then progressively stronger persuasive messages to smoke was a key element of this approach. Students were also taught to be prepared to respond to peer pressure to smoke with counterarguments and refusal skills.

The initial success of this approach attracted considerable interest and stimulated a flurry of studies testing variations on the social influence prevention model. More recent approaches to school-based substance abuse prevention can be classified into approaches that emphasize social resistance skills training, normative education, and competence enhancement.

Resistance skills training. Variations of the social influence approach developed by Evans (1976) have also been tested. These preventive interventions were also designed to increase awareness of social influences to smoke, drink, or use illicit drugs. However, a distinguishing characteristic of these interventions is that they placed a greater emphasis on teaching skills for resisting peer and media influences to smoke, drink, or use drugs. This prevention approach is based on a conceptual model that gives central importance to the role that social influences play in the onset of substance use among adolescents. According to this model, adolescents begin to smoke, drink, or use drugs as the result of social influences from the family, peers, and the media that promote and support substance use. All social influences are a product of the interaction between an individual's learning history and forces in the family, peer group, local community, and larger society (Bandura, 1977). Positive expectations related to substance use (e.g., increased alertness, lower anxiety, higher social status) are influenced initially by the social learning processes—the observation and imitation of significant others such as parents, siblings, peers, and media personalities. Later, expectations are further shaped by direct experience.

Normative education. Another prevention approach that recognizes the primacy of social influences is referred to as *normative education.* This approach can either be used alone or in combination with the resistance skills approach. Evans, Hansen, and Mittlemark (1977) observed that adolescents' estimates of the prevalence of cigarette smoking were consistently higher than the actual rates, giving adolescents the impression that smoking was a normative behavior—essentially something that everyone did. To address this disparity, educational content and activities were developed to correct those inaccurate perceptions. Teaching students about the actual rates of smoking, drinking, or use of other drugs is intended to reduce perceptions of the high prevalence and social acceptability of substance use, thereby establishing normative expectations consistent with lower substance use. For example, one strategy is to conduct a classroom activity in which students are first asked to estimate the rate of tobacco, alcohol, or other drug use. After that, they are presented with information concerning the actual rates. This can be done by providing students with information from national prevalence data or conducting their own local (classroom, school, or community) survey and then presenting the results in class. In addition to debunking the

myth that substance use is prevalent and socially acceptable, normative education activities aim to modify the perception that substance use is harmless.

Competence enhancement. A more comprehensive approach that incorporates elements of resistance skills and normative education is referred to as *competence enhancement.* A distinguishing feature is its emphasis on teaching general life skills to increase resilience by enhancing personal and social competence and promoting positive youth development. The theoretical foundation for this approach includes social learning theory (Bandura, 1977) and problem behavior theory (Jessor & Jessor, 1977). Substance abuse and other problem behaviors are conceptualized as behaviors that are socially learned. For example, competence enhancement posits that adolescents with lower personal and social competence are more susceptible to social influences promoting substance use and that those individuals are more motivated to engage in substance use as an alternative to more adaptive coping strategies (Botvin, 2000).

Competence enhancement teaches some combination of the following self-management and social skills. Self-management skills include critical thinking and problem solving, decision making, skills for resisting peer and media influences, goal-setting and self-directed behavior change, and adaptive coping strategies for managing stress and anxiety. Social skills include skills for meeting new people and making friends, communication skills, and assertive skills. These cognitive–behavioral skills are taught in class using skills training methods that usually include instruction, demonstration (teacher, peer leader, and video), behavioral rehearsal, feedback, reinforcement by the teacher, and practice outside of class through homework assignments. Many of the skills taught are derived from cognitive–behavioral therapy and are intended to prevent the development of potential problems while also helping young people successfully navigate developmental tasks, increase resilience, and facilitate healthy psychosocial development. They also use concepts, principles, and techniques from clinical psychology such as shaping through goal setting, successive approximation, self-monitoring, self-reinforcement, cognitive restructuring, progressive relaxation, and mindfulness.

The skills taught are designed to enable adolescents to effectively handle the many challenges they confront in everyday life. For example, students are taught to resist peer pressure to engage in substance use (such as how to refuse an offer to smoke or drink at a party). Evidence has suggested that broad-based skills training approaches may not be effective unless they also contain material that specifically targets substance use (Caplan et al., 1992). Therefore, this approach usually includes elements of the resistance skills or normative education approaches. Together, they target a wide range of risk and protective factors for substance abuse.

Prevention Modalities

There are several major prevention modalities that include approaches designed to be delivered in schools, families, communities, and workplaces. Each is briefly described below.

School-based prevention. Much of the development and testing of evidence-based approaches to drug abuse prevention among children and adolescents has taken place in school settings. School-based efforts are efficient from both an implementation and an evaluation perspective because schools offer access to nearly all young people, classrooms provide an excellent setting for implementing preventive interventions, and students can typically be assessed and followed over time with greater precision than in studies with community samples.

Family-based prevention. Contemporary family-based prevention approaches for adolescent substance use provide parents with the skills to nurture, bond, and communicate with children; monitor their children's activities and friendships; establish and enforce family rules regarding substance use; and help their children develop prosocial skills and social resistance skills. Whether they focus on parents alone or the entire family, these programs often aim to improve family functioning, communication skills, and rule setting with regard to substance use (Lochman & van den Steenhoven, 2002).

Community-based prevention. Substance abuse prevention programs delivered in community settings often have multiple components such as a school program, a family or parenting component, a mass media campaign, or all of these. Given the broad scope of activities involved, these interventions require a significant amount of resources. Program components may be managed by a coalition of stakeholders including parents, educators, and community leaders.

Workplace prevention. To address the issue of alcohol, tobacco, and other forms of substance use among employees in the workplace, a number of substance abuse prevention programs designed for work settings have been developed and tested. Workplace prevention programs often integrate prevention into broader health promotion programming that emphasizes stress management and coping techniques for reducing risk factors associated with substance use while promoting other behaviors such as proper nutrition and weight management (Bennett & Lehman, 2003; Cook & Schlenger, 2002).

The emergence of the multidisciplinary field of prevention science has integrated previously disparate areas of research and practice and contributed to advances in the prevention of mental and physical health problems. Prevention science incorporates elements of psychology, education, and public health and identifies risk factors and protective mechanisms through rigorous research with target populations and uses findings to inform the development of evidence-based preventive interventions.

Principles of Prevention Science

The application of principles from prevention science has significantly advanced substance abuse prevention. From a prevention perspective, a thorough understanding of the behavioral epidemiology of substance use, combined with knowledge of key risk and protective mechanisms, has been critical to the development of effective prevention of adolescent substance use. Although the immediate goal of substance abuse prevention efforts is to delay the onset and escalation of substance use among youths, these efforts are often part of a broader strategy to promote the positive development of children, adolescents, and young adults.

Use developmentally appropriate approaches. Effective prevention programs aim to promote protective factors, reduce risk factors, and help young people to engage successfully with their peers, families, schools, and communities so that they can ultimately become healthy productive adults. Thus, it is helpful to understand how developmental factors can influence the onset and progression of substance use. As noted previously, the onset of substance use typically occurs during early adolescence and progresses in a logical and predictable sequence throughout the adolescent years and into young adulthood. Most individuals start by using alcohol and tobacco, progressing on to the use of marijuana and, for some, other illicit substances.

The key implication for prevention is that prevention programs intended, for example, for elementary and middle school students should focus on the use of substances (alcohol and tobacco) that occur at the beginning of this developmental progression and should use universal prevention approaches targeting the entire population in this age group. Not only does this involve aiming preventive interventions at the two most widely used substances in the United States, but the focus on early-stage substance use also offers the potential to disrupt the developmental progression that may otherwise lead to using dependency-producing illicit substances and more severe forms of drug involvement. For older adolescents, selective interventions (targeting individuals already at risk for substance use) and indicated interventions (targeting individuals already using drugs) are the most appropriate.

Target multiple risk and protective factors. Effective preventive interventions are designed to target an array of risk and protective factors associated with the etiology of substance abuse, which include demographic and sociocultural factors, genetic and neurobiological factors, personality and individual characteristics, and family and peer influences (Scheier, 2010). No single factor or pathway serves as a necessary and sufficient condition leading to substance use and abuse. Rather, substance use is the result of a multivariate

mix of factors. Some of these are malleable, and others are not.

Demographic factors (e.g., age, gender, social class), cultural factors (e.g., acculturation), and environmental influences (e.g., community disorganization, availability of drugs) can have an impact on substance use and abuse. Environmental influences including neighborhood disorganization, violence, drug availability, and poverty increase adolescent and adult substance abuse and other problem behaviors (Cerdá et al., 2010). For example, low socioeconomic status neighborhoods are often characterized by high adult unemployment, high rates of mobility, and a lack of informal social networks and controls, and these factors can contribute to substance abuse.

Genetic factors are thought to be influential in some individuals who abuse psychoactive substances (Conner et al., 2010). Research has shown that children of parents with alcohol and drug problems are significantly more likely to develop substance abuse problems than children whose parents do not have alcohol or drug problems, even among identical twins reared apart. The pharmacology of commonly abused substances varies, although animal research has indicated that several drugs of abuse (cocaine, amphetamine, morphine, nicotine, and alcohol), each with different molecular mechanisms of action, affect the brain in a similar way by increasing strength at excitatory synapses on midbrain dopamine neurons (Saal et al., 2003).

Social factors are the most powerful influences promoting the initiation of tobacco, alcohol, and drug abuse during adolescence. This domain includes family factors, peer influences, and media influences (Bahr, Hoffmann, & Yang, 2005). Family influences include the attitudes and behaviors of parents and siblings in regard to substance use, and research has demonstrated that parents' use of alcohol, 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. Other family factors include the quantity and quality of parenting practices (monitoring, communication, and involvement) and family structure (e.g., two-parent vs. single-parent families). In terms of peer influences, associating with peers who engage in substance use is likely to promote substance use, establish substance use as normative behavior, and provide opportunities to learn and practice substance use behaviors. Finally, substance users are often portrayed in the mass media (e.g., in movies, TV shows, music videos) as popular, sophisticated, successful, and sexy. Furthermore, the modeling of substance use and abuse by media personalities and positive messages about substance use in popular music, movies, and other media are powerful influences promoting substance use.

Personal factors associated with adolescent substance abuse include holding favorable attitudes or expectancies regarding substance use, believing that it is normative or highly prevalent, and being unaware of the negative consequences of use (Piko, 2001). Poor social competence skills (e.g., the ability to use a variety of interpersonal negotiation strategies and to communicate clearly and assertively) and poor personal competence skills (e.g., cognitive and behavioral self-management strategies such as decision making and self-regulation) are additional risk factors (Botvin, 2000). Substance use is associated with a number of psychological characteristics including deficits in mood, self-esteem, assertiveness, and self-efficacy, as well as elevated anxiety, impulsivity, sensation seeking, and rebelliousness (Swadi, 1999).

Use theory to guide intervention development. Consideration of the many factors associated with the etiology of substance abuse does not easily lead to a prevention strategy or necessarily serve as a guide to intervention development. Some type of organizing framework is needed to help understand how the numerous risk and protective factors associated with substance abuse interact and the mechanism through which an individual progresses from nonuse to use, abuse, and dependence. Therefore, two important characteristics of evidence-based prevention approaches are that they are based on empirical findings from research concerning the etiology of substance abuse and they are theory driven. Together, they can help guide preventive intervention development.

A variety of models have been developed or applied to the phenomenon of adolescent substance

use and abuse (reviewed in Petraitis, Flay, & Miller, 1995) in an attempt to integrate the large number of risk and protective factors that contribute to the etiology of substance use and abuse among youths. Social learning and social influence theories describe the importance of substance-using role models, such as parents, siblings, relatives, and friends (Akers & Cochran, 1985). Social attachment and conventional commitment theories including the social development model (Hawkins & Weis, 1985) describe the processes by which certain youths withdraw from parents or school and begin to associate with peer groups that encourage drug use and other antisocial behavior. Cognitive theories include the health belief model (Becker, 1974) and theory of planned behavior (Ajzen, 1988), which emphasize how perception of risks, benefits, and norms and personal vulnerability regarding substance use work together to influence the decision-making processes. Personality and affective theories such as the self-medication hypothesis (Khantzian, 1997) illustrate the roles that individual psychological vulnerabilities and affective characteristics play in the development of substance use and abuse.

Broad social psychological theories such as problem behavior theory (Jessor & Jessor, 1977) integrate multiple determinants of adolescent substance use, proposing that substance use and other problem behaviors serve a functional purpose from the perspective of the adolescent. That is, youths come to believe that engaging in a problem behavior such as substance use can help them achieve social or personal goals they otherwise cannot achieve. Theories highlight the role that peers play in substance use, in ways that transcend mere social influences. For example, self-derogation theory (Kaplan, 1980) suggests that adolescents who are negatively evaluated by conventional others or feel deficient in socially desirable attributes experience low self-esteem that becomes a driving motivational factor leading to rebellious behavior against conventional standards. Substance use can be one of these rebellious behaviors.

Use interactive methods. Although the strategy and content of preventive interventions are key ingredients in effective approaches, the way an intervention is delivered is also important. A notable characteristic of effective prevention programs is the use of interactive intervention methods (Tobler & Stratton, 1997). Interactive methods foster the active engagement of participants in the intervention rather than the passive role commonly used in traditional tobacco, alcohol, and drug education programs that rely on didactic methods such as lectures, films, and videotapes. This is particularly noteworthy in school-based prevention programs involving children and adolescents. Examples of interactive methods in school-based programs include class discussion, interactive games, and skills-training exercises involving skills demonstration, behavioral rehearsal (in-class practice), feedback and reinforcement (praise), and behavioral homework assignments (extended practice outside the classroom). Many of these techniques are familiar to clinical psychologists, particularly those engaged in cognitive–behavioral therapy.

These different intervention methods also have implications for the role of the person delivering the preventive intervention (teacher, peer leader, health educator, psychologist, nurse, or other health professional). With noninteractive methods, the role is similar to that of a regular classroom teacher, with an emphasis on lecturing and a straightforward didactic presentation of factual information. The role of the program provider using interactive methods, however, is that of a discussion facilitator and skills-training coach. Although preventive interventions often use a combination of delivery methods, educational approaches that rely on information dissemination largely use noninteractive, didactic methods, whereas resistance skills training and competence enhancement programs that emphasize skills-building largely use interactive methods.

Include booster sessions to maintain effects. It is important that prevention effects be maintained over time to produce an individual and public health benefit. However, even well-designed, theory-driven preventive interventions can suffer from an erosion of the initial prevention effects. This is similar to the phenomenon of recidivism or relapse observed with treatment programs, whereby end-of-treatment outcomes decay over time.

A number of factors can contribute to the erosion of initial prevention effects, including the length and strength of the intervention, poor implementation fidelity (incomplete or poor-quality implementation), and a faulty intervention approach (Resnicow & Botvin, 1993). Another factor often overlooked for children and adolescents is that they continue to be exposed to psychosocial factors that increase risk for substance abuse. For example, they may still encounter peers or media influences promoting substance use.

As with treatment programs, initial program effects can be maintained (or even enhanced) with booster sessions. In the case of substance abuse prevention programs, booster interventions are typically shorter (i.e., have fewer sessions) than the original intervention and are intended to review, reinforce, and extend the material learned previously. For example, a 12-session prevention program might contain six booster sessions in the 2nd year and three booster sessions in the 3rd year.

Implement with fidelity. Preventive interventions should be implemented with fidelity to the underlying model or approach—that is, as intended by the developer, as thoroughly and completely as possible, and using methods appropriate for the approach. This is supported by research that has clearly indicated that higher fidelity leads to better outcomes (Durlak & DuPre, 2008). For example, in our own research, students whose teachers adhered more closely to the content and activities of the prevention program showed lower levels of substance use (Botvin et al., 1995). In the case of evidence-based approaches, it is only by implementing interventions as tested in the research demonstrating their effectiveness that there can be a reasonable expectation of achieving similar outcomes.

However, the implementation of evidence-based programs in regular practice settings often varies substantially from that achieved in carefully executed randomized trials (Gottfredson & Gottfredson, 2002). Prevention practitioners (e.g., teachers, peers, or prevention specialists) may deviate from the content and procedures of the intervention, not recognizing that failure to implement a preventive intervention as intended can undermine its effectiveness. The recognition that fidelity tends to be lower in many practice settings raises concerns about the impact of lower fidelity on effectiveness. Failure to implement evidence-based programs with adequate fidelity is likely to undermine effectiveness and these programs' potential for reducing adolescent substance use and abuse. Therefore, logic and the empirical evidence argue for placing an emphasis on fidelity.

Practitioners, however, make the case that high fidelity is unachievable in real-world settings, that efforts to promote fidelity are not likely to be successful, and that some degree of program change is inevitable. Although achieving high fidelity may indeed be difficult when evidence-based prevention programs are taken to scale, there is at least some evidence to indicate that it is possible. Although there may be some tolerance for lower fidelity, a concern voiced by those advocating for a strict fidelity approach is that if prevention programs are not implemented with fidelity, they are not likely to be effective. Adapting an evidence-based program by adding, deleting, or modifying key elements may have an adverse impact on essential ingredients and undermine effectiveness. Thus, in light of evidence that higher fidelity yields stronger prevention effects, it seems reasonable to conclude that every effort should be made to obtain the highest possible degree of fidelity to preserve program integrity (Elliott & Mihalic, 2004).

Consider the population and contextual factors. There are clear benefits to implementing evidence-based programs with fidelity in terms of producing better outcomes, but there are also possible benefits to adaptation, at least under certain conditions. This leads to a conundrum of sorts—a tension between competing imperatives, one for fidelity and another for adaptation.

A compelling rationale for adapting a prevention program involves attempts to improve the fit of the intervention for a specific culture or population. For example, a strong case has been made for adapting interventions to ethnic minority populations (Castro, Barrera, & Martinez, 2004). If there is a cultural mismatch between a particular intervention

and the target population, it could adversely affect implementation, undermine effectiveness, and serve as a barrier to maintenance and institutionalization. Research has shown that individuals working with ethnic minority populations were more likely to adapt interventions to make them more culturally appropriate (Ringwalt et al., 2004). It can also be argued that tailoring an intervention to a local population can improve buy-in by local stakeholders and acceptability by the target population and increase the potential that the intervention will be institutionalized. Still, others are wary that any adaptation runs the risk of undermining effectiveness (Elliott & Mihalic, 2004).

Thus, there are competing benefits to an emphasis on fidelity over adaptation. The primary benefit of an emphasis on fidelity is a greater likelihood of achieving prevention effects that are similar to those found in the randomized trials supporting evidence-based programs—that is, increased effectiveness. However, this may be at the cost of lower perceived flexibility, cultural appropriateness, and long-term sustainability through institutionalization. Alternatively, adaptation allows for the incorporation of contextual factors that can facilitate tailoring programs to local needs, increasing cultural relevance, increasing acceptability to the target population, and potentially increasing effectiveness and long-term sustainability. The bottom line is that it is important to strike the proper balance between fidelity and tailoring, so that any adaptations adhere closely to the underlying intervention model and do not undermine the core elements (active ingredients) of effective prevention approaches.

LANDMARK STUDIES AND RESEARCH EVIDENCE

The prevention literature has grown considerably over the past three decades, and now includes many high-quality studies indicating that some approaches are effective in preventing the use or abuse of tobacco, alcohol, and illicit drugs. Several landmark studies clearly show the superiority of prevention approaches designed to decrease the social influences to engage in substance use, either alone or in combination with approaches designed to increase adaptive coping skills, personal competence, and resilience.

Shifting the Paradigm to Social Influences

A landmark study in substance abuse prevention, and the first to show behavioral effects on adolescent cigarette smoking, was a study based on the work of Richard Evans (1976). The classroom-based program was designed to target the psychosocial factors promoting adolescent cigarette smoking, and it was based in part on the concept of psychological inoculation. Early classroom exposure to social influences to smoke was hypothesized to reduce later vulnerability to these influences in real-world settings. In addition to exposure to pro-smoking social influences, students were taught specific techniques for resisting those influences. First, students were taught counterarguments to positive portrayals of smoking. For example, if they saw someone trying to act tough by smoking, students were taught to think, "If they were really tough, they wouldn't have to smoke to prove it." Second, students were taught refusal skills for dealing with peer pressure to smoke. For example, if someone offered them a cigarette and they were called chicken for refusing, they were taught how to respond in such situations (e.g., "If I smoke to prove to you that I'm not chicken, all I'm doing is showing that I'm afraid of what you might say if I don't smoke. I don't want to smoke and I'm not going to just because you want me to").

To determine the impact of these strategies, classrooms were randomly assigned to one of three conditions: (a) periodic assessment and feedback concerning class smoking rates, (b) periodic assessment and feedback plus psychological inoculation, and (c) a no-intervention control group. The results of this study showed that smoking onset rates for the two intervention conditions combined were about 50% lower than rates in the control group (Evans et al., 1978).

Variations on the Social Influence Approach

During the 1980s, variations on Evans's (1976) prevention model were tested. In addition to increasing

students' awareness of social influences to engage in substance use, these preventive interventions placed more emphasis on teaching specific skills for effectively resisting both peer and media pressures to smoke, drink, or use drugs. The initial studies testing variations on the social influence approach focused on preventing the onset and escalation of adolescent cigarette smoking, and later studies examined intervention effects on the onset and escalation of alcohol and illicit drug use. Most studies targeted junior high school students beginning with seventh graders and focused primarily on cigarette smoking. Results of these studies found reductions of 30% to 45% in the proportion of individuals beginning to smoke, relative to controls. Similar reductions were reported for alcohol and marijuana use (Ellickson & Bell, 1990; Shope et al., 1992).

The results from some studies of school-based social influence approaches indicated that positive behavioral effects can be maintained for as long as 3 years after the conclusion of the intervention (Luepker et al., 1983; Sussman et al., 1993) or as long as 7 years for multicomponent interventions (Perry & Kelder, 1992). However, long-term follow-up studies have revealed that prevention effects are typically not maintained (Ellickson, Bell, & McGuigan, 1993; Shope et al., 1998). School-based prevention programs that are powerful enough to produce durable effects on behavior need to focus on a broader and more comprehensive set of etiological factors and skills-building activities.

Testing DARE

One of the most widely known and disseminated substance abuse prevention programs based on the resistance skills model is Drug Abuse Resistance Education, or DARE. The DARE curriculum is typically provided in school settings to youths in the fifth or sixth grade. The program disseminates information about drug prevention and incorporates elements of social resistance skills training. A defining characteristic of DARE is that it uses trained, uniformed police officers to teach the drug prevention curriculum in the classroom. DARE has been embraced by many communities and police departments throughout the country, contributing to its wide-scale dissemination.

However, rigorous evaluations and meta-analytic studies of DARE have shown that it has produced little, if any, effects on drug use behavior, particularly beyond the initial posttest assessment (Ennett et al., 1994; Rosenbaum & Hanson, 1998). Because the DARE program has much in common with other social resistance prevention approaches, its poor evaluation results are difficult to explain. The primary difference between DARE and similar, more effective programs is the program provider (police officer and classroom teacher, respectively). Those at highest risk for engaging in substance use and other problem behaviors are likely to rebel against authority figures. Because police officers represent the ultimate symbol of authority in our society, they may have lower credibility with high-risk adolescents and thus be less effective as prevention providers. In a study that used police officers from the national network of DARE providers to deliver a separate universal drug prevention curriculum to students (called "Take Charge of Your Life"), findings indicated a negative program effect for use of alcohol and cigarettes and no effect for marijuana use for the sample as a whole (Sloboda et al., 2009). Taken together, rigorous studies have shown that DARE is not effective and have suggested that police officers may not be effective as program providers.

Beyond Social Influences to Competence Enhancement

The competence enhancement prevention model grew out of early research with the social influence approach and its variations. Using principles and techniques from clinical psychology, it extended the focus of skills training from resistance skills training to a broader set of general social skills and personal self-management skills. An example of a prevention program based on the competence enhancement model is Life Skills Training (LST), a universal school-based prevention approach that teaches self-management and social skills combined with drug-refusal skills and norm-setting activities. The program consists of 15 classes taught in the 1st year of middle or junior high school, along with booster sessions in the 2nd year (10 classes) and 3rd year (five classes) of middle or junior high.

A series of evaluation studies resulting in more than 30 peer-reviewed publications has demonstrated the effectiveness of the LST approach. The initial efficacy studies of LST focused on preventing cigarette smoking among predominantly White, middle-class students. Additional studies found that LST is more effective when booster sessions are included after the initial year of intervention; that it is effective when delivered by different types of program providers (e.g., teachers, peer leaders, health professionals); and that it can prevent the use of tobacco, alcohol, marijuana, and other illicit drugs (reviewed in Botvin & Griffin, 2015). Several large randomized trials have demonstrated the long-term effectiveness of the LST program with different populations.

The largest randomized controlled trial (RCT) testing LST involved nearly 6,000 predominantly White students from 56 junior high schools in New York State. Schools were randomly assigned to prevention and control conditions. Students who received the LST program had lower rates of cigarette smoking, alcohol use, and marijuana use than students in the control condition at the end of ninth grade (Botvin et al., 1990) and at the end of 12th grade (Botvin et al., 1995).

A second large-scale prevention trial examined the effectiveness of LST in a population of more than 3,600 predominantly minority urban youths attending 29 middle or junior high schools in low-income neighborhoods in New York City. Students who received the prevention program reported less smoking, drinking, drunkenness, inhalant use, and polydrug use (i.e., the use of multiple drugs) at the posttest and 1-year follow-up assessments than students in the control group who did not receive the prevention program (Botvin et al., 2001a). Studies reporting further analyses of these data found that LST prevented the onset of cigarette smoking and reduced escalation of cigarette smoking by 30% among adolescent girls (Botvin et al., 1999), cut binge drinking by 50% for as many as 3 years among inner-city boys and girls (Botvin et al., 2001b), and was effective for high-risk youths (Griffin et al., 2003). Taken together, findings from these RCTs provide substantial evidence for the effectiveness of the competence enhancement approach to substance abuse prevention across diverse populations.

Promoting Parenting Skills, Family Communication, and Bonding

Research has shown that parenting and family functioning can affect substance use among youths, both directly and indirectly. Harsh disciplinary practices and high levels of family conflict are associated with established precursors of adolescent substance use, such as aggressive behavior and other conduct problems among children. Thus, early intervention that promotes effective parenting may indirectly have a protective effect on substance use in later years as children enter adolescence. An example of this approach is the Nurse–Family Partnership program, an evidence-based program in which nurses make home visits to work with pregnant women to improve their health practices relevant to birth outcomes. In the program, nurses continue with home visits for as long as 2 years after childbirth to foster parents' caregiving skills and attitudes. Nurses are also trained to encourage young mothers to enhance their own development by providing advice to women on completing their education, seeking employment, and making appropriate choices about their next pregnancy.

In a study of more than 700 low-income, predominantly minority pregnant women, the Nurse–Family Partnership program was found to have a positive and long-lasting impact not only on family functioning, but also on rates of alcohol, tobacco, and marijuana use among the children as teenagers (Olds et al., 2010). The program may work by teaching decision-making skills to mothers, improving the family environment and ultimately leading to improvements in the children's ability to control their behavior and to succeed academically. Research has shown that these are all important protective factors with regard to substance use during the transition to adolescence.

Family prevention programs designed for families with adolescents also address key proximal risk and protective factors. Firm and consistent limit setting, careful monitoring, nurturing and open communication patterns with children, and family rules about substance use are protective factors for youth substance use. An example of an evidence-based prevention program designed for families is the Strengthening Families Program: For Parents and

Youth 10–14. The program is a skills training intervention designed to enhance school success and reduce youth substance use and aggression among youths ages 10 to 14 years. The program includes seven 2-hour sessions in which groups of parents and their children meet separately with an instructor for 1 hour and then meet together for family activities for a 2nd hour. Parents learn about the risk and protective factors for substance use along with several key parenting and family functioning skills related to parent–child bonding, parental monitoring, appropriate discipline practices, and managing family conflict. Children are instructed in ways to resist peer influences to engage in substance use.

In an RCT of the Strengthening Families Program: For Parents and Youth 10–14 provided to sixth graders and their parents, intervention youths were less likely to engage in alcohol, tobacco, and marijuana use than control group youths, and these effects persisted when students were assessed in the 10th grade, 4 years after baseline (Spoth, Redmond, & Shin, 2001). Finally, analysis of long-term follow-up data showed that a family-based prevention program (the Strengthening Families Program) in combination with a school-based prevention program (LST) found reductions in nonmedical prescription drug abuse among young adults who received the preventive interventions during middle school (Spoth et al., 2013). The findings indicated that a brief family skills preventive intervention designed for general populations, alone or in combination with a school-based prevention program, can reduce adolescent substance use with behavioral effects that persist over time.

Establishing Community Coalitions to Promote Prevention

Given the variety of prevention modalities and evidence-based programs available, it can be difficult for a community to comprehensively take steps to prevent the problem of youth substance use. A number of community collaboration models provide guidance on how a coalition of stakeholders in a community can work together to maximize the use of prevention resources. One such model is Communities That Care (CTC), a program that uses an effective community change process to help communities prevent substance use and related problems before they develop. An initial step for communities using CTC is to assess the local prevention needs in a community and identify the existing resources available for addressing these needs. On the basis of these data, CTC helps community leaders create a community action plan, define clear goals and objectives, and then select and implement evidence-based prevention programs and policies while strengthening programs that already work. Final steps in the CTC process involve providing guidance to key stakeholders so that they can effectively monitor prevention activities to track progress and measure results to ensure improvements are achieved.

CTC was tested in an RCT that included 24 communities across seven states and followed a panel of more than 4,400 students beginning in Grade 5. By the eighth grade, students from the CTC communities were less likely to have initiated the use of alcohol, cigarettes, or smokeless tobacco than students in the control communities (Hawkins et al., 2009). Significant intervention effects on alcohol and cigarette use continued to be observed in a follow-up assessment in the 10th grade (Hawkins et al., 2012). This research indicates that substance use among youths can be prevented when a coalition of community stakeholders are trained to effectively translate advances in prevention science into well-implemented prevention practices.

KEY ACCOMPLISHMENTS AND KNOWLEDGE BASE

There are many notable accomplishments in the area of substance abuse prevention and the larger field of prevention science that provide practitioners with a better understanding of what works. They have also resulted in large-scale dissemination efforts to promote the sustained use of evidence-based prevention approaches.

Development of Prevention Science

The systematic study of adolescent risk behaviors along with research on preventing these behaviors has driven the development of prevention science. This research has targeted a range of behaviors

(e.g., substance use, high-risk sexual behaviors leading to sexually transmitted infection and teen pregnancy, aggression and violence, mental health problems) and populations (e.g., children, adolescents, and adults from diverse population subgroups), in a variety of settings (e.g., schools, homes, workplaces), and using a range of intervention modalities along the prevention spectrum from universal to selective and indicated approaches.

Prevention research has progressed from studies on the developmental epidemiology of substance abuse to the development and testing of preventive interventions tested in large-scale randomized trials. Findings are contributing to evidence-based practices and policies that, if widely implemented, offer the potential to reduce the mortality and morbidity associated with substance abuse. These evidence-based exemplary or model programs are guiding practitioners and policymakers, transforming the practice of prevention throughout the country.

Establishment of Best Practices in School-Based Prevention

The growing number of well-designed prevention studies has given researchers the opportunity to conduct meta-analyses and systematic reviews of the published studies on preventing smoking, alcohol use, and illicit drug use among children and adolescents.

Preventing smoking. A comprehensive review examined 49 RCTs of school-based interventions to prevent smoking among children and adolescents ages 5 to 18 years; studies were included if they followed students for at least 6 months (Thomas, McLellan, & Perera, 2013). Programs or curricula in the review focused on providing information, social resistance skills, or competence enhancement skills, and some had additional intervention components that took place outside of schools, in the community. Findings indicated that programs emphasizing a combination of competence enhancement and social resistance skills were effective in preventing the onset of smoking in the short term, within 1 year of follow-up. Programs emphasizing information only, social resistance skills only, and multimodal interventions were ineffective in the short term. For longer term effects beyond 1-year follow-up, programs that emphasized either competence skills alone or competence enhancement combined with social resistance skills were effective. At the longest follow-up, the intervention group had an average 12% reduction in smoking onset compared with the control groups. Interventions that used adult providers (usually classroom teachers) were found to be more effective than those that used peer providers. Booster sessions were effective in the short and longer term for combined competence enhancement and social resistance skills programs.

A separate meta-analysis of school-based smoking prevention examined 65 adolescent psychosocial smoking prevention programs among students in Grades 6 to 12 published between 1978 and 1997 in the United States (Hwang, Yeagley, & Petosa, 2004). Programs were categorized into three prevention approaches (social resistance, social resistance plus cognitive skills, and social resistance plus cognitive plus affective skills) and two delivery settings (school and school plus community). Behavioral effects were observed and persisted over a 3-year period, with the strongest effects on smoking observed with programs that included social resistance combined with cognitive or affective skills training activities (i.e., competence enhancement), programs that included both school and community components in their implementation, or both.

A new classroom-based approach to preventing smoking that has been widely implemented in Europe involves providing incentives for students to remain smoke free. These programs are typically implemented for students ages 11 to 14 who commit to not smoking for a period of time, often 6 months. If the majority of students (90%) remain smoke free, their classroom is eligible to compete for incentives that may include class trips, special activities, or monetary awards. Although only a few studies have tested this approach, and the existing studies have varied considerably in their scientific rigor, a review found no evidence that incentive programs are effective in preventing smoking initiation among youths (Johnston, Liberato, & Thomas, 2012).

Preventing alcohol use. A comprehensive review examined universal school-based alcohol prevention studies designed to prevent alcohol use among children up to age 18 (Foxcroft & Tsertsvadze, 2011b). The prevention trials included educational interventions that focused on raising awareness of the dangers of alcohol misuse along with changing normative beliefs, as well as more comprehensive approaches that developed psychological and social skills in young people (e.g., peer resistance, problem solving, decision-making skills). Some of the studies included in the review ($k = 11$) focused on alcohol use alone; of these, six produced statistically significant reductions in alcohol use relative to controls. A second group of studies ($k = 39$) targeted alcohol use in combination with smoking, illicit drug use, or antisocial behavior. Of these, 14 reported significant positive effects on alcohol use. Across studies reporting significant prevention effects, the most commonly observed beneficial effects were for heavier levels of alcohol use such as drunkenness and binge drinking.

A number of programs for preventing alcohol use and abuse have focused on college-age youths. These programs include social norms interventions that aim to correct misperceptions about the prevalence and social acceptability of drinking using social marketing techniques, individualized personal normative feedback, or some combination of these approaches (Perkins, 2002). Social marketing interventions are often campuswide media campaigns that educate students about typical drinking behaviors. Interventions for students who engage in alcohol misuse often use motivational interviewing to encourage them to evaluate discrepancies between their risky drinking behavior and their own academic, social, or other life goals, thereby increasing their intrinsic motivation to reduce drinking (Carey et al., 2007). In a review of social norms interventions for college students, Moreira, Smith, and Foxcroft (2009) found that campus social norms interventions were more effective in reducing drinking than control group conditions (no intervention, printed drinking-related advice, or some other type of intervention that did not provide normative feedback). For short-term outcomes of up to 3 months, social norms interventions delivered in individual face-to-face sessions or delivered by web or computer were both effective. Studies that used web- or computer-based feedback showed longer term effects for as long as 16 months.

Preventing illicit drug use. In a review on school-based programs for preventing illicit drug use (Faggiano et al., 2014), 51 RCTs of middle or junior high school–based interventions were included. The authors classified the interventions as primarily skills focused, affect focused, or knowledge focused. Findings indicated that skills-based interventions significantly reduced marijuana use and hard drug use and improved decision-making skills, self-esteem, peer pressure resistance, and drug knowledge relative to usual curricula (treatment-as-usual controls).

Another meta-analysis examined the impact of school-based prevention programs on reducing cannabis use among youths from age 12 to 19 (Porath-Waller, Beasley, & Beirness, 2010). Fifteen randomized prevention trials were included in the meta-analysis, and findings indicated that these programs had an overall positive effect on cannabis use compared with controls, with an average effect size of $d = 0.58$ (95% CI [0.55, 0.62]). Programs that focused on social resistance skills, perceived norms, and competence skills were more effective than programs that focused solely on resistance skills. The more effective programs had 15 or more classroom sessions, were interactive, and were facilitated by providers other than classroom teachers.

In summary, several meta-analyses have examined the effectiveness of school-based programs to prevent alcohol, tobacco, and other forms of substance use. The most effective school-based prevention programs are interactive, focus on building drug resistance skills and general competence skills, and are implemented over multiple years.

Best Practices in Family-Based Prevention

In a review of nine family-based controlled studies for preventing smoking, Thomas, Baker, and Lorenzetti (2007) identified RCTs designed to deter the onset of tobacco use among children (ages 5–12) or adolescents (ages 13–18) and other family members. Findings indicated that four of the nine studies had

significant positive effects on smoking behavior, although one showed a significant negative effect. Five additional RCTs were identified that tested a family intervention against a school intervention. However, none of the family programs produced significant incremental effects compared with the school programs alone. The authors concluded that some well-executed RCTs provided evidence that family interventions can prevent adolescent smoking, but RCTs that were less well executed had mostly neutral or negative results. The authors also concluded that how well program staff are trained and how well they deliver the program are related to effectiveness.

In a review of universal family-based prevention programs to prevent alcohol misuse in young people as old as age 18 years, Foxcroft and Tsertsvadze (2011a) identified 12 relevant RCTs in the literature. The programs focused on developing parenting skills (e.g., parental support, parental monitoring, and establishing clear boundaries or rules), and some also focused on promoting social and peer resistance skills among youths along with the development of positive peer affiliations. Findings indicated that nine of 12 studies reported positive effects of the family-based interventions on youth alcohol use. Four of the effective interventions focused on young females. The authors concluded that there were small but generally consistent prevention effects that lasted medium to long term for family-based prevention programs for alcohol misuse.

In summary, a variety of family-based substance abuse prevention programs have been studied, and interventions that focus on both parenting skills and family bonding appear to be the most effective in reducing or preventing substance use. An important challenge in family-based prevention is the difficulty in getting parents to participate; families at the highest risk for substance use are least likely to participate in prevention programs (Al-Halabi Díaz et al., 2006).

Best Practices in Community-Based Prevention

A comprehensive review examined multicomponent community-based programs to prevent smoking in children and adolescents (Carson et al., 2011). Of the 25 studies included in the analysis, all used a controlled trial design, and 15 studies randomized units (communities or schools) to an intervention or control condition. Studies were included if they assessed smoking behavior in people younger than age 25. Findings indicated that 10 studies reported a reduction in smoking and, of these, nine reported significant long-term effects of smoking behavior of more than 1 year. Improvements in secondary outcomes such as smoking intentions or attitudes were seen in the majority of studies. Furthermore, nine of the 10 effective programs incorporated school-based interventions with delivery by school teachers, six had parental involvement, and eight had intervention durations longer than 12 months. The authors concluded that there is some limited support for the effectiveness of coordinated multicomponent community prevention programs in reducing smoking, although the research has important methodological limitations.

A separate review examined the extent to which multicomponent prevention programs were effective in preventing alcohol use among youths age 18 or younger (Foxcroft & Tsertsvadze, 2011a). Twenty trials were identified in the literature and, of these, 12 showed effects on alcohol use that ranged from 3 months to 3 years. The authors attempted to determine whether single- or multiple-component programs differed in effectiveness, and only one of seven studies showed a benefit of delivering multiple components in more than one setting.

The effectiveness of preventive interventions implemented in nonschool settings has also been examined (Gates et al., 2006). Seventeen studies were identified, and the intervention methods included education or skills training, motivational interviewing or brief intervention, family interventions, and multicomponent community interventions. However, the authors found that the intervention approaches were too different and there were too few studies to draw firm conclusions on the effectiveness of drug abuse prevention programs implemented in nonschool settings.

In summary, the evidence is somewhat mixed with regard to community-based approaches to substance abuse prevention. Although some are promising, major limitations of community-based

prevention approaches are that they are typically expensive and labor intensive and require a high degree of coordination to manage the multiple components.

Best Practices in Workplace Prevention

Because workplace prevention programs have the potential to decrease absenteeism, accidents, turnover, and workers' compensation costs and to increase employee productivity and morale, the costs of implementing prevention programs in the workplace may be offset by the multiple advantages they provide for both employees and employers (Deitz, Cook, & Hersch, 2005). Broad-based employee wellness and health promotion programs that address a range of risk and protective factors, combined with clear company policy on drug abuse prevention, may lead to less substance use and abuse among employees both at home and at work. To date, there have been relatively few rigorously designed workplace prevention evaluation studies.

Disseminating Evidence-Based Prevention

The ultimate goal of research concerning the etiology and prevention of substance use and abuse is to promote the sustained use of effective preventive interventions and thereby reduce the deleterious health and social consequences associated with these behaviors. To achieve that goal, it is necessary not only to develop effective approaches but to disseminate those approaches and ensure that they are implemented in a manner that preserves their effectiveness. Clinical psychologists can facilitate the dissemination of evidence-based prevention.

Several initiatives have been launched to identify and promote the use of prevention approaches that have been carefully tested using accepted research methods. These science-to-practice initiatives were developed by the Center for Substance Abuse Prevention at the Substance Abuse and Mental Health Services Administration, the U.S. Department of Education's Safe and Drug Free Schools program, and the U.S. Department of Justice's Office of Juvenile Justice and Delinquency Prevention, as well as the National Institute on Drug Abuse and the Centers for Disease Control and Prevention. These initiatives have typically included identifying effective prevention programs and policies, compiling and publishing lists of model or exemplary programs, and conducting conferences to disseminate information on what works. Although these initiatives began to achieve some degree of success in promoting the use of evidence-based interventions, research examining school-based prevention has indicated that the vast majority of schools in this country did not implement evidence-based programs (Ringwalt et al., 2002). In addition to funding, other factors to consider in promoting widespread dissemination of evidence-based preventive interventions include greater simplicity, flexibility, and ease of use. Furthermore, efforts to take evidence-based programs to scale and move from science to practice have highlighted the need for more research to better understand the factors influencing adoption, implementation, and sustainability.

FUTURE DIRECTIONS

Significant advances have been made in the prevention of substance abuse over the past few decades. Prevention approaches have been rigorously tested and found effective in preventing the initiation and escalation of adolescent tobacco, alcohol, and other drug use. Notwithstanding these advances, many challenges remain to be addressed.

Refine Existing Approaches

Prevention effects have been found for approaches that target the social influences to engage in substance use. More comprehensive approaches that target both interpersonal and intrapersonal factors by incorporating aspects of the social influence approach with a broader competence enhancement approach teaching general social skills and adaptive self-management skills has produced stronger and more durable prevention effects. However, additional research is needed to refine these approaches further and identify new approaches that may be even more effective. Multicomponent approaches that address a comprehensive set of risk and protective factors by combining the strengths of school, family, and community interventions warrant further research to produce more powerful and durable prevention approaches.

Promote Evidence-Based Practice

There is also a need to better understand how to best disseminate effective prevention programs internationally. Many of the most rigorously tested and empirically validated substance abuse prevention programs were initially developed in the United States, based largely on theories developed in the United States. Many of these interventions are being adopted for use in Europe and many other areas of the world. It is important that efforts to adapt and disseminate evidence-based programs in new cultures and settings are approached using rigorous, standardized methods.

A number of conceptual models for replicating and disseminating evidence-based programs outline issues related to cultural adaptation as well as the process of negotiating needed changes at the organizational and community levels. One such model, the replicating effective programs framework (Kilbourne et al., 2007) grew out of an initiative at the Centers for Disease Control and Prevention. Replicating effective programs describes a multistage process of systematic and effective strategies that community-based organizations can use for the wide-scale dissemination of evidence-based interventions. The model describes how to identify needs of the local community, select effective interventions to address those needs, ensure that the selected intervention fits local settings, and identify implementation barriers. Other preimplementation steps involve setting up a community working group and pilot testing the intervention package to understand logistical issues at the local level. Training and technical assistance protocols and procedures need to be developed for intervention providers, and steps should be taken to examine the effect of the intervention on key outcomes. The replicating effective programs and similar dissemination models may be helpful as practitioners adopt preventive interventions developed elsewhere.

Align Substance Abuse Prevention With National Priorities

Substance abuse prevention is a key component of the national drug control strategy and a high priority for drug policy initiatives, according to the Office of National Drug Control Policy (2013). More research is needed to increase knowledge of the etiology of substance use, refine and improve existing evidence-based prevention approaches, and develop novel approaches suitable to multiple populations. Translational research is also necessary to better understand and overcome barriers to moving from science to practice. Moreover, to achieve large-scale reductions in substance abuse and its adverse consequences, new initiatives (supported by adequate funding) are necessary to promote the widespread use of evidence-based programs and policies.

Historically, federal agencies have funded prevention grants that focus on a single outcome (e.g., drug use, underage drinking, or bullying) within specific communities (e.g., a single school district or municipality). The recognition that a common set of risk and protective factors contribute to a range of problems among young people suggests the need for a more coordinated approach in which different agencies work together to target common risk and protective factors related to substance abuse, mental health, and chronic diseases such as cardiovascular disease and various cancers. Effective preventive interventions that are developmentally and culturally appropriate and capable of being implemented at multiple levels and across multiple venues need to be developed, rigorously tested, and widely disseminated.

Promoting the sustained use of evidence-based prevention programs and policies is a national priority. Although substantial progress has been made in both the science and the practice of prevention, much remains to be accomplished. Working together with educators and other health professionals, clinical psychologists have the skills and knowledge to advance prevention research and practice as well as to facilitate the widespread dissemination of evidence-based substance abuse prevention. When successful, substance abuse prevention reduces substance abuse and its adverse consequences and provides an important opportunity for reducing future health costs.

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