

Prevention of Substance Use and Substance Use Disorders

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Although most young people who initiate the use of alcohol and other drugs (including tobacco) do not go on to develop a substance use disorder (SUD) (Lisdahl et al. 2018), the risk of developing a serious problem is greatly increased if drug use begins during adolescence (National Institute on Drug Abuse 2014). For example, adolescents that initiate substance use before age 14 years are at a significantly elevated risk to develop a SUD later in adolescence (Winters and Lee 2008) and have a 34% prevalence rate of a lifetime SUD (Substance Abuse and Mental Health Services Administration 2015). Yet delaying the onset of use can dramatically alter a youth's future risk; as a young person matures between 13 and 21 years, the likelihood of a lifetime

SUD drops approximately 4%–5% for each year that initiation of substance use is delayed (Substance Abuse and Mental Health Services Administration 2015). In this chapter, to facilitate a better understanding of the nature of vulnerability to drug use, we summarize individual and environmental risk and protective factors that place adolescents at risk for or protect them from initiating and maintaining drug use (National Research Council and Institute of Medicine 2009). We then provide an overview of evidence-based prevention approaches and discuss various challenges associated with implementing drug prevention programs as communities and schools seek to “scale up” a program and move it from “bench to trench.”

Nature and Extent of the Problem

Preventing alcohol, tobacco, and other drug use among adolescents is a national priority (National Research Council and Institute of Medicine 2009). The estimated annual cost of abuse and dependence to U.S. society, including health care, law enforcement, crime, social, economic, and other costs, exceeds \$530 billion (National Institute on Drug Abuse 2014). Although we cannot be certain who among those adolescents who try alcohol or other drugs or tobacco will develop a drug problem, longitudinal developmental studies that monitor the progression of drug use over time have identified a number of individual-level and environmental factors that are significantly associated with a higher likelihood of progressing from early experimental levels of drug use to a SUD. However, even with this knowledge, there is no silver bullet—or one causal factor that, if changed, would stop progression to a drug problem. There are many sources of increased risk, and many avenues lead to acquisition of substance abuse problems.

Background of Prevention Efforts

Very early efforts to prevent substance use and resulting consequences were largely ineffective, and both reviews and meta-analyses underscored the lack of rigorous evaluations. Thus, in the 1980s, when many drug prevention programs first became available, it was not clear whether substance abuse could be effectively prevented. In response, a number of prevention scholars advocated taking a public health approach (Catalano et al. 1998; DuPont et al. 2018).

The public health framework suggests that if you want to prevent a problem before it happens, you have to change the etiological factors associated with initiation and onset of drug use. In part as a response to the ineffectiveness of prevention efforts at the time, prevention researchers began to increasingly explore through longitudinal developmental studies the predictors of early stages of adolescent substance involvement. Through increasing investment in research, a set of longitudinal predictors of substance use—often called *risk factors* and *protective factors*—were identified at the individual, family, school, peer group, and community levels. The findings of this research began to be summarized in the 1980s and 1990s (National Research Council and Institute of Medicine 2009), and public health approaches were developed and tested using longitudinal research methods, leading eventually to the development of a wide range of effective prevention approaches (Hawkins et al. 2008).

Role of Risk and Protective Factors

Risk factors are those predictors associated with an increased likelihood of substance use and/or abuse or other behavioral disorders (National Research Council and Institute of Medicine 2009). Risk factors can encompass individual-level measures (e.g., genetic predisposition, personality, risk taking) and also the environments in which youth are socialized, including in the family (e.g., family conflict), at school (e.g., school failure), in peer group (e.g., friends who use), and in the community (e.g., neighborhood distress and availability of alcohol and drugs). Many risk factors for substance abuse are etiological risk factors for other problems, including delinquency, violence, teen pregnancy, dropping out of school, depression, and acting out and related behavior problems. Table 2–1 illustrates the predictive relationship between various risk factors and different types of problem behaviors. A check at the intersection of a row and column means there have been at least two longitudinal studies demonstrating that a particular risk factor predicts the specific health and behavior problems. As can be seen in the table, many of the same risk factors predict multiple problems. For example, the risk factor of “low neighborhood attachment and community disorganization” has been shown to predict youth substance abuse, delinquency, and violence. Because they predict future problem behaviors, malleable risk factors are potential targets for preventive action. Changing the risk factor of low neighborhood attachment

and community disorganization has the potential to ameliorate all three undesirable outcomes.

Risk Factors

For many youth, the accumulation of risk begins early in childhood as they face numerous developmental challenges that without any offsetting protective influences become exacerbated as the youth are exposed to new environments (e.g., school and peers). This has been referred to as a “snowball” pattern of risk (Mitchell et al. 2001) to denote the rolling accumulation of risk. A variant of this pattern of risk develops when adolescents are exposed to risk by, for instance, affiliating with drug-using friends. Over time, continued exposure to peers through socialization and selection (different forms of risk), in the absence of any protective influences, can increase vulnerability to an accumulation (i.e., “snowstorm”) of other risk factors (Toumbourou and Catalano 2005). Thus, for example, selection of drug-abusing friends might also be exacerbated by deviant attitudes and by opportunities for risky behavior that occur when socializing with drug-abusing friends. Below we provide brief descriptors of risk factors within four highly relevant domains: community, family, school, and individual.

Community Factors

Multiple factors at the community level have been associated with substance use and abuse. Perceived or actual availability of drugs, high levels of residential mobility, community laws or norms favorable to drug use, and community disorganization and low neighborhood attachment (i.e., cohesion among residents) are all associated with substance use (Beyers et al. 2004).

Family Factors

There is substantial evidence that children of alcoholics or addicts are at greater risk of developing abuse and dependence (see, e.g., Kendler et al. 2014). Some portion of this risk may be genetic, while a portion may reflect intergenerational transmission of poor coping skills, mental health problems, and family dysfunction (Prom-Wormley et al. 2014). There is also evidence that vulnerability to drug use is generalized across substances in adolescence (Young et al. 2006), and the developmental progression from initial experimentation through regular use to a SUD appears to be accompanied by a de-

Table 2–1. Risk factors for adolescent problem behaviors

Risk factors	Substance abuse	Delinquency	Teen pregnancy	School dropout	Violence	Depression and anxiety
Community						
Availability of drugs	✓				✓	
Availability of firearms		✓			✓	
Community laws and norms favorable toward drug use, firearms, and crime	✓	✓			✓	
Media portrayals of violence	✓				✓	
Transitions and mobility	✓	✓		✓		✓
Low neighborhood attachment and community disorganization	✓	✓			✓	
Extreme economic deprivation	✓	✓	✓	✓	✓	
Family						
Family history of the problem behavior	✓	✓	✓	✓	✓	✓
Family management problems	✓	✓	✓	✓	✓	✓

Table 2–1. Risk factors for adolescent problem behaviors (*continued*)

Risk factors	Substance abuse	Delinquency	Teen pregnancy	School dropout	Violence	Depression and anxiety
Family (<i>continued</i>)						
Family conflict	✓	✓	✓	✓	✓	✓
Favorable parental attitudes and involvement in the problem behavior	✓	✓			✓	
School						
Academic failure beginning in late elementary school	✓	✓	✓	✓	✓	✓
Lack of commitment to school	✓	✓	✓	✓	✓	
Individual/peers						
Early and persistent antisocial behavior	✓	✓	✓	✓	✓	✓
Alienation and rebelliousness	✓	✓		✓		
Friends who engage in the problem behavior	✓	✓	✓	✓	✓	
Favorable attitudes toward the problem behavior	✓	✓	✓	✓		
Early initiation of the problem behavior	✓	✓	✓	✓	✓	
Constitutional factors	✓	✓			✓	✓

crease in the influence of shared environmental factors (family, peers) and a corresponding increase in the role of genetic and unique environmental vulnerability (Pagan et al. 2006).

Poor family management practices that elevate risk for substance use and problem behavior include parents' failure to set clear expectations for children's behavior; failure to supervise and monitor children; and excessively severe, harsh, or inconsistent punishment (Scheier and Hansen 2014). Children exposed to such poor family management practices are at increased risk for substance abuse and other problem behaviors (Brewer et al. 1995). Also, children who grow up exposed to high levels of family conflict—between their parents (i.e., marital distress) or between parent and child—are more likely to engage in drug use and exhibit problem behaviors than children raised in more harmonious families (National Research Council and Institute of Medicine 2009). In these instances, drug use may represent a form of coping with stress or finding ways to reduce anxiety that arises from feeling neglected by family members as well as being exposed to high levels of hostility among family members that can interfere with the acquisition of appropriate social-emotional regulation skills (Prom-Wormley et al. 2014). Parental attitudes favorable to drug use also play an important role in determining adolescent drug abuse (Peterson et al. 1994). This includes parental approval of drinking and drug use (National Research Council and Institute of Medicine 2009). Parents who tolerate deviance in the form of rebellious children, and who fail to monitor their activities (i.e., know where they are after school and know their playmates), tacitly support their children to violate norms and commit rules transgressions through permissive or inattentive parenting strategies.

School Factors

Academic failure increases the risk of later substance use as well as other problem behaviors (Centers for Disease Control and Prevention 2009). Young people experience school failure for a combination of reasons: they may lack stimulating teachers; they may have learning problems; they may feel neglected by their peers, have few friends, and withdraw from school; or they may experience low commitment to school. Low commitment to school often arises when youth no longer see the role of student as meaningful and rewarding. In many cases, students lack investment in learning; either they feel school is unsafe or they lack prosocial peer bonds and do not experience supportive

encouragement from teachers and staff (Gottfredson and Gottfredson 2002; Karlamangla et al. 2006).

Individual and Peer Factors

Factors at the individual level include the individual's temperament, social preferences, and perceptions of harm associated with drug use. The greater the variety, frequency, and seriousness of antisocial behavior in childhood (Englund et al. 2008), as well as tolerance for deviance (e.g., Zucker 2008), the greater the likelihood for future substance abuse. Also, peer use of substances is a consistent predictor of substance use among youth (National Research Council and Institute of Medicine 2009).

Studies of peer influence on drug use have demonstrated that involvement with antisocial peers is a strong predictor of tobacco, alcohol, and other drug use, as well as criminality and risky sexual behavior (e.g., Oxford et al. 2001). The influence of peers perhaps captures a form of interactive continuity, in which deviant youth seek friendships that support their personality and behaviors. In addition, there is some evidence that peer influence may be moderated by youth perceptions of peers' attitudes toward academic achievement (Bryant and Zimmerman 2002).

Additional individual factors include favorable attitude toward substance use (Lipari et al. 2017; Spoth et al. 2008); disinhibitory traits (sensation seeking, low harm avoidance, risk taking, impulsivity, poor inhibitory control) (Byrne and Worthy 2019; King and Chassin 2008); low academic motivation and poor self-esteem (Scheier 2001); and onset of substance use during early adolescence (Zucker 2008).

Protective Factors

Protection is afforded to youth exposed to fewer risk factors and also occurs when specific developmental factors operate to buffer the effect of risk and reduce the likelihood of drug use (Dryfoos 1990). *Promotive factors* are etiological processes that have a direct negative relationship with substance use and abuse.

Social, Emotional, and Cognitive Competence

Competence encompasses a range of interpersonal skills that help youth integrate feelings, thinking, and actions to achieve specific social and interpersonal

goals (Masten 2001). These skills include encoding relevant social cues, accurately interpreting those cues, generating effective solutions to interpersonal problems, making decisions, realistically anticipating consequences and potential obstacles to one's actions, and translating social decisions into effective behaviors (Consortium on the School-Based Promotion of Social Competence 1994). Randomized controlled drug prevention trials have demonstrated that enhancing competence (e.g., decision making, problem solving, self-management and anxiety reduction skills) protects youth from drug use (Borvin and Griffin 2004). Included in this domain is high intelligence; it may be that such youth have high-level social and emotional competence and are more able to take advantage of an enriched environment and to cope with high-risk situations and environments (Hawkins et al. 1992).

Resilient Temperament

Resilience represents an individual's adaptive capacity to manage change and stressful events in healthy and flexible ways. Resilience has been empirically identified as a characteristic of youth who when exposed to multiple risk factors or grow up facing adversity show successful responses to challenge. These youth are, in essence, able to transform adversity and find ways from what they have learned to achieve successful outcomes (Masten 2001). Pathways to substance abuse can often be traced back to the earliest years of life. For example, Williams and colleagues (2000) noted that a positive, sociable, and flexible temperament in early infancy and early childhood offered protection against later adolescent substance abuse. Wills and Ainette (2010) provide a comprehensive review of the temperament and drug use literatures.

Opportunities for and Recognition of Positive and Prosocial Experiences

Children who have developmentally appropriate opportunities to be meaningfully involved with the family, school, or community are less likely to develop problems (Darling and Steinberg 1993). For a child to acquire key interpersonal skills in early development, positive opportunities must be available (National Research Council and Institute of Medicine 2009). It is especially important for adolescents to interact with positively oriented peers and to be involved in roles in which they can make a contribution to their group, whether family, school, neighborhood, peer group, or larger community (Dryfoos 1990). Also,

parents, teachers, and peers who provide recognition to the teenager for exhibiting skillful behavior and making healthy decisions can motivate the teenager to achieve prosocial goals (Guo et al. 2001). Various theories can be used to explain how association with prosocial figures produces conventional behavior, but the simplest learning explanation is that youth identify with and “introject” the values of the prosocial role models and benefit from this process through valued reward structures (e.g., parents reward their children for valued behavior).

Evidence-Based Programs

The 1980s witnessed a new generation of experimental studies evaluating drug prevention programs. This involved a slate of experimental studies that strategically focused on modifying predictors of a single problem, like substance use. These studies met with a modicum of success; however, they spawned discussion regarding the focus of prevention and whether it was best to focus on a single outcome (i.e., drug use), when youth engaged in many delinquent activities, with some using drugs and others engaging in related high-risk behaviors. Eventually, lively discussions among scientists, practitioners, and policy makers increasingly converged along a set of refined critiques and recommendations. Their recommendations suggested that prevention science should provide the research base supporting a focus on the intersection of the individual and his or her environment, and that, furthermore, these approaches should address the whole child and not be focused on a single problem behavior, with an emphasis on reducing developmentally salient risk and enhancing protective factors.

Randomized controlled trials conducted since the mid-1980s have demonstrated that a range of effective prevention approaches can reduce risk, increase protection, and reduce problem behaviors (National Research Council and Institute of Medicine 2009). Information detailing the various strategies underlying these programs is available at the website for the Campbell Collaboration (www.campbellcollaboration.org). We briefly review several of these programs and provide examples of their active ingredients and intervention modalities. However, we caution that the effectiveness of these programs will vary depending on numerous implementation factors, including their settings, compliance with study protocols (fidelity), and other factors (e.g., student receptivity, organizational climate) that influence program efficacy when implemented on a large-scale basis across communities.

School-Based Programs

School-based prevention approaches typically involve primary or “universal” prevention approaches that emphasize providing social and personal skills to all students in attendance regardless of their levels of risk. This should arguably provide the biggest bang for the dollar, as both low- and high-risk students present in school are exposed to the intervention. The intervention strategies include teaching social and assertiveness skills to help youth resist negative peer influences (e.g., offers to use drugs), and providing decision-making, self-management, and problem-solving skills to help them navigate the trials and tribulations of adolescent development. The same programs include teaching youth different ways to detect media influences that promote cigarette or alcohol use as well as providing normative education to help correct misperceptions regarding the social acceptability of drug use and also dispel the perceived benefits of drug use (Botvin and Griffin 2004). Additional programs emphasize enhancing instructional and classroom management skills and include classroom curricula to promote social, emotional and cognitive competence (Ialongo et al. 1999). There is also evidence that programs focusing on improving academic performance, increasing bonding to school, and reducing classroom management problems as early as elementary school produce reductions in early forms of aggressiveness including acting out, disruption, minor delinquency, and conduct problems later in life (Kellam and Anthony 1998).

Conrod (2016) tested a school-based program that is tailored based on an assessment of the student’s personality risk. Self-reports were obtained from each student assessing their levels of hopelessness, anxiety-sensitivity, impulsivity, and sensation seeking, and this evaluation was used to assign students to an appropriate experimental condition. Compared with the control groups (no-intervention or a two-session group coping skills intervention targeting one of the four personality risk factors), the group in the tailored program had significantly lower drinking behaviors at 6-month follow-up, and some favorable effects were also apparent at 12 and 24 months postintervention. A replication study produced similar findings with a larger sample (Conrod 2016). Personality-tailored preventive interventions are a promising approach, one that is likely to have a significant presence in future applications of prevention research (Conrod 2016).

School-based brief selective interventions are an emerging trend to address students with substance use problems that are not yet severe (e.g., do not meet criteria for moderate to severe substance use disorder). Examples of evidence-based programs include brief strategic family therapy (Waldron and Turner 2008), MET/CBT5 (Godley et al. 2001), and Teen Intervene (Winters et al. 2012).

Parenting Programs

Programs that take a family-based or parenting-skills approach show significant though modest effects (Kelly and Connor 2012). Family-based prevention programs that emphasize malleable risk and protective factors, including boundaries, monitoring the adolescent's behaviors, frequent and effective parent-child communication, and attending to related family dynamics, produce long-term effects not only on substance abuse and dependence but on other problem behaviors as well (Kumpfer et al. 2018; Winters et al. 2014).

For example, the Nurse-Family Partnership program works with young, childless, single mothers during their first pregnancy until their child is 2 years old. The program focuses on teaching these mothers how to provide nurturing and supportive environments for their children and how to interact with their children in a way that promotes social and emotional competence (Olds et al. 1998). Another example is Guiding Good Choices (Hawkins and Catalano 1988). This five-session, 2-hour parent training program provides practical information for parents about the risks for and dangers of early initiation of substance use, and emphasizes a) creating opportunities for involvement and interaction in the family and rewarding children's participation in the family; b) establishing clear family rules about substance use, monitoring the behavior of children, and using consistent moderate discipline; c) teaching children skills needed to resist peer influences to use drugs; and d) reducing and managing family conflict (Hawkins and Catalano 1988). There is now considerable evidence for long-term effects of this program (Park et al. 2000).

Community Programs

Community-based prevention programs take a social systemic approach to prevention. Such programs bring together diverse stakeholders, and potentially combine human and financial resources, for more effective and sustainable community-based preventive efforts (see, e.g., Pentz et al. 2006). Communi-

ties That Care (CTC) is one of several exemplary community-based prevention programs. The program provides education and tools for community decision making in order to organize, assess, and prioritize prevention needs; match efficacious programs to prioritized needs; and provide training and technical assistance for implementing evidence-based programs with fidelity. Randomized control trials of CTC (involving 24 communities in the United States) that have followed students beginning at age 10 to 13 years showed reductions in the initiation of delinquency and alcohol use (past 30 days) during adolescence and durable program effects lasting into early adulthood (Hawkins et al. 2008; Oesterle et al. 2018). Reductions in cannabis use were not observed; however, the age of the CTC sample at follow-up was younger than the age at which cannabis use typically escalates among U.S. youth (16–17 years).

Environmental Strategies

Community-wide policies that seek to reduce supply (e.g., minimizing exposure to drugs and drug-using networks) and to change norms can also have a positive impact. For example, policies to restrict availability of tobacco to young people have resulted in decreased cigarette smoking among youth (Forster et al. 1998). Also, community-wide policy changes to reduce availability of alcohol to youth, including increasing the drinking age and restricting how alcohol is sold (Nelson et al. 2013), have decreased consumption and the frequency of alcohol-related traffic accidents and fatalities. Other examples include legislating a higher minimum age at which one may legally buy alcohol or cigarettes and modifying zoning ordinances that allow high density of liquor outlets in a neighborhood. For example, one law that has had a profound effect on alcohol-related mortality is raising the legal drinking age to 21. The research evidence supports that a legal drinking age of 21 years is associated with decreased alcohol-related motor vehicle fatalities (see Wagenaar and Toomey 2002 for review). On the other hand, more permissive laws that allow greater accessibility to alcohol or drugs are associated with increased use. For example, the recent changes in marijuana legislation, both legalizing and decriminalizing the drug in the United States, are associated with increased use of marijuana by adolescents and young adults (Johnston et al. 2018).

The media is also a tremendous influence in early-stage drug use. The intense attachment to social media by youth may be a risk factor for substance use. For example, alcohol-related Facebook activity (e.g., alcohol depictions

by written postings or photos and images) was shown to be associated with binge drinking among college students (Marczinski et al. 2016), and the use of social media in general may promote binge drinking (Ceballos et al. 2018). Yet this intense attachment to social media by youth may itself provide an effective avenue for intervention (see Chapter 16 for further discussion).

Implementation of Prevention Programs

No matter how well conceived a drug prevention program, its efficacy hinges on the program being implemented well and with great care. Implementation addresses the issue of “the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice, and, hence, to improve the quality and effectiveness of health services” (Eccles and Mittman 2006, p. 1). Regardless of venue (clinic, school, health care center, or service provider agency), the implementation process commences by introducing decision makers and key stakeholders to the basic concepts of a behavior change strategy. This process usually involves a presentation by the program developer’s staff followed by an internal discussion among potential adopters. The discussion emphasizes the appropriateness of a specific program, whether there is sufficient empirical evidence supporting its use, economic factors that may come into play (cost and potential loss of economic productivity from down staff time during training), ease of implementation, and whether there are sufficient staff resources to shoulder the burden associated with implementation. Also, the agency (school or clinic) will want to know whether the program has long-term public health implications and whether it will address the needs of their population in a timely fashion. In short, practitioners have to feel that the program is desirable, compatible with their needs, cost-efficient, and easy to use and does not place too great a demand on their resources. It is this uptake of an “off the shelf” program that is the focus of implementation, and the entirety of the process is sometimes called “diffusion” or “technology transfer.”

Organizations intent on implementing a behavior change program usually commence with an “in-service” training that targets practitioners (e.g., teachers or health educators) to optimize program delivery. As part of their training, staff work closely with the program developers to learn about factors that will boost fidelity (e.g., limiting adaptations). Practitioners should be knowl-

edgeable about the theoretical framework that guides the intervention, its rationale, and the extent of its effectiveness. They must also have confidence they can efficaciously implement the program using the appropriate interactive techniques demonstrated to them during training. Fidelity to the core principles must be explained with an understanding that adherence to the lessons (structure and length) and quality teaching practices (interactive techniques) play a crucial role in program implementation and the success of the program on student outcomes.

Coaching has been shown to be fruitful in classroom-based interventions, including drug prevention programs (Ringwalt et al. 2009). Coaching helps to overcome certain barriers, which can include inadequate training and poor institutional support. Some drug prevention programs require the use of innovative interactive teaching strategies, a skill over which some implementers may show relatively little mastery. In a 3-year study of the All Stars prevention program, a drug prevention curriculum, Ringwalt and colleagues (2009) reported that students in classrooms with coached teachers reported lower rates of cigarette escalation (from non-use to use) compared with students exposed to the prevention curriculum delivered by noncoached teachers.

Other factors also come into play, including the program's sustainability and whether there is appropriate institutional buy-in to maintain the program beyond the initial thrust (i.e., continued financial support, dedication of personnel resources, a stable champion to reinforce buy-in, and related organizational climate factors that influence program institutionalization). Although many educators consider health promotion programs "extraneous to the core business of schools" (Bond et al. 2001), these efforts bear heavily on program sustainability from the point of adoption moving forward (Scheirer 2005).

Fidelity

Practitioners must implement a program as it was designed without deviations in delivery format or content. At its heart, fidelity consists of adherence, quality of delivery, and participant responsiveness (Dane and Schneider 1998). Programs characterized by high fidelity achieve better program outcomes (see, e.g., Flannery et al. 2014). Process evaluations can be used to assess program fidelity by gathering independent observational data (e.g., coding students and teachers during a live session), videotaping, completing provider-prepared checklists that determine coverage and levels of enthusiasm, and garnering feedback

from those receiving and delivering the prevention program. Youth feedback is a crucial part of this process and can reveal their level of engagement in the program, whether they found the instructional methods and program content intriguing and also developmentally appropriate. Recent evidence reinforces the instrumental role in program outcomes played by student engagement (Hansen et al. 2019). There is also a growing literature documenting that teachers' attitudes toward the prevention program, reflecting their enthusiasm, support, and willingness to apply newly acquired instructional strategies, influence program outcomes (Aarons 2005). Practitioners must feel "motivated and inspired" to readily adopt a new innovation and believe that youth will benefit from the training, so they have added impetus to teach to the curriculum. Rohrbach et al. (2007) showed that trained and highly motivated teachers maintained adherence in program delivery and produced the same student outcomes in a drug prevention program that program specialists did.

School Fidelity

School-level factors may also influence fidelity and determine in part program outcomes. Key school-level factors that have been shown to influence program outcomes are leadership or the administration's voice to support the program (Kam et al. 2003), organizational readiness to maintain implementation at all costs (Beets et al. 2008), and quality of providers (Payne and Eckert 2010) and provider training (Hanley et al. 2009).

Adaptation

Frequently, practitioners waver in their fidelity and make modifications to both content and delivery format (Ringwalt et al. 2004). Indeed, there is never 100% compliance in real-world settings given the individualism associated with classroom-based teaching. No two teachers are alike in their delivery or even their expectation of student behavior. Some argue that flexibility should be built into implementation to ensure overall "fit" to the target population (Cohen et al. 2008). The demand for flexibility hinges partly on the need to modify the program delivery to address local needs of the population, emergent or otherwise. The absence of flexibility can produce dissent among practitioners responsible for the program's delivery or diminish enthusiasm among the target population who feel that with rigid adherence to a program their needs are not being met. In many cases practitioners feel they have their finger

on the pulse of the participants because of their familiarity with them (working with the clientele day-to-day), and they institute changes to make the program more responsive to the target population. A teacher, for instance, can make subtle changes to the prescribed order of a program (i.e., sequence of intervention modules), incorporate personal anecdotes, utilize local community news to support relevant topics, or vary instructional modalities to teach a particular lesson. While all of these examples are well intentioned, they may go against the grain of the intervention, reducing the time on task and effectively leaving youth with less exposure to the core competencies contained in the curriculum.

There is considerable debate revolving around the latitude that is required for adaptation, particularly as it attends to “cultural adaptations.” Resnicow et al. (2000) introduced the concept of “surface” versus “deep” structure changes to bring attention to the different levels of adaptation that can be instituted. Surface structure changes refer to food choices, cultural myths, mores, customs, and beliefs. Deep structure changes, on the other hand, refer to the core competencies and active ingredients of a program, which are by necessity tied to psychological factors that may in and of themselves reflect social, environmental and cultural influences. Most program developers are reluctant to allow deep structure changes because core competencies are theoretically tied to the program’s rationale and active ingredients. There are, however, very good examples of where cultural adaptation to maintain relevance has worked favorably. The keepin’ it REAL program is culturally grounded, with videotape materials for the curriculum created by Hispanic youth (Colby et al. 2013). Today, the program has achieved national dissemination as a part of the D.A.R.E. initiative (Day et al. 2017).

Future of Prevention Efforts

Despite their availability and federal government impetus to use evidence-based drug prevention programs, there are relatively low rates of adoption nationwide. One factor undermining the success of school-based interventions, according to Fixen et al. (2009), is the instrumental role played by practitioners (e.g., schoolteachers, health educators), who are the “intervention agent” and who function within unique systems that influence program outcomes. The plethora of moving parts and deviations introduced into each system produces

an incredible volume of implementation differences, all veritably uncontrollable from an experimental point of view.

Perhaps a key piece toward improving adoption of evidence-based programs is to better understand if the actual methods used to teach drug prevention are developmentally sound and engaging to the students. Consider, for example, that role-plays are a formidable part of the interactive nature of drug prevention. Meta-analyses suggest that programs with interactive components produce better outcomes (Ennett et al. 2003; Tobler et al. 2000). However, the literature is rife with comparisons of the relative efficacy of core components (e.g., normative education vs. resistance training), rather than contrasting instructional methods (other than who delivers the program). Traditionally, meta-analyses coded “interactivity” dichotomously, indicating its presence or absence only, with no further dissection that could yield information on which instructional modality produced the largest effect. Moreover, the literature pays scant attention to whether youth enjoy role-plays, whether they like the curriculum and its delivery format, and to what extent they are receptive to the drug prevention messages (this is particularly noteworthy for media campaigns). Qualitative studies using formative evaluation techniques are an essential tool that can be used to help address this concern, but they are rarely applied (see, e.g., Boys et al. 1999).

There is little intersection between instructional methods for drug prevention and core subjects like math, English, or social sciences. Academic subjects rely heavily on rote memorization and finely tuned study habits. Drug prevention programs are more “experiential” and rely on cooperative learning involving candid discussion of family social interactions (boundaries, monitoring, and communication), peer influences and contexts that support deviant behavior, and application of critical thinking skills to achieve lifestyle congruence, to name just a few examples. The differences in teaching and learning strategies are best evidenced by the reliance in drug prevention on small group discussions and presentations accentuating relevant prevention themes, as well as competitive games that address normative misperception of drug use (e.g., Hansen 2015) or cognitive misperceptions and myths about drug use (e.g., Sussman 2015). The success of drug prevention programs should be measured in ways that demonstrate that students are learning new skills and are engaged in this learning process in an enthusiastic manner and that this

combined instructional approach is reducing risk for maladaptive developmental outcomes.

This brings up the question whether alternative instructional technologies exist for teaching drug prevention. Using computer-mediated technology (i.e., personal computers or tablets accessing the Internet or smartphone and mobile devices) might reduce the stigma associated with having to discuss personal issues, family dynamics, and drug use in front of peers. These eHealth programs are self-paced, are accessible on demand, involve multimedia instructional technology, and capitalize on stealth learning principles. They also build on the principle of scaffolding, involving slow accretion of problem-solving skills, which is vital to student learning. A growing literature shows that many of the eHealth programs can achieve similar outcomes to classroom-based instructional programs, the latter of which are resource intensive and interfere with curricular instruction time (Champion et al. 2013). Overall, there has to be more work done to distinguish the relative merits of teaching and instructional strategies in drug prevention and more qualitative studies that are grounded in the lives of the target population.

Key Points

- Important prevention implications emerge from the research on risk and protection and the evaluation of prevention approaches.
- For maximum effect, prevention programs should address risk and protective factors early, for example, at the stage of development when the risk factor first emerges in the population, and they should address both individual and community-level factors.
- Numerous evidence-based preventive interventions are available to schools and communities.
- To optimize its effectiveness, a prevention program needs to be implemented by adhering to the basic principles of implementation fidelity, one of which centers on the need to administer the program as it was designed and closely deliver the intervention modalities.

- The challenge for prevention efforts in the early twenty-first century in the United States is to overcome the relatively low rates of adoption of widely available evidence-based drug prevention programs.
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