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Chapter 16
Preventing Substance Abuse and Addiction

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Beyond the obvious social benefits of preventing substance abuse among teenagers, studies have shown that substance abuse costs America hundreds of billions of dollars per year (Harwood, 2000), and implementing effective prevention programs would save an estimated $18 to the nation for every dollar spent on prevention programming (SAMHSA Center for Substance Abuse Prevention, 2008). Adolescence is the developmental period that can be clearly identified as the most "sensitive period" for the onset of experimentation with drugs and alcohol, as well as the risk for transition from use to problematic use to dependence (Jordan & Andersen, 2016). Studies have found that by 12th grade, and certainly by college, many adolescents report binge drinking and using marijuana (Degenhardt et al., 2008; Johnston, O'Malley, Bachman, & Schulenberg, 2010). The earlier this binge drinking, often considered alcohol abuse in the literature, and drunkenness occurs in life, the more likely these individuals are to develop significant functional (such as behavioral) problems and alcohol-related disorders, a finding that has been replicated in many different countries (Kuntsche et al., 2013; Lee & DiClemente, 1985; Parrella & Filstead, 1988). While there are many risk factors for developing substance-related problems, including genetic, personality, attachment, and environmental (e.g., Meyers & Dick, 2010; Ormel et al., 2012; Schindler & Bröning, 2015), much research (both brain research and longitudinal research) has supported the fact that delaying the onset of experimenting with substances, including cigarettes, alcohol, drugs, and concurrent use of multiple substances, is the most effective strategy for preventing both problems and addiction later in life (Buchmann et al.,

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2013; Gillespie, Neale, & Kendler, 2009; Grant, Stinson, & Hartford, 2001; Hingson, Heeren, & Winter, 2006; Lisdahl, Gilbart, Wright, & Shollenbarger, 2013; Moss, Chen, & Yi, 2014). In fact, Bukstein and Kaminer (2015) found that when the use of substances was controlled at age 18, there was no significant link between major risk factors and either the rate/intensity of use in adulthood or the negative consequences of use in adulthood. Thus, targeting adolescent substance use (and abuse) can effectively curtail problematic consequences and addiction later in life.

Theoretical Foundations of Prevention

The field of prevention science has been through a significant history of thought, trial, and error. Multiple theoretical models have emerged throughout the years, to varying success. Although some have been somewhat high-profile failures (such as the "Just Say No" campaign and D.A.R.E.'s early models; Paglia & Room, 1999; West & O'Neal, 2004), there is significant promise (and conceptual overlap) in many of the theoretical models widely used presently.

Information Dissemination

Early efforts to prevent substance abuse among youth were centered on increasing knowledge about the negative consequences of using drugs and alcohol. Disseminating information about both the proximal consequences (such as bad breath from cigarette smoking and poor decision making when using alcohol) and distal consequences (such as physical problems from alcohol and cigarette abuse and longer-term risk of addiction) and allowing students to ask questions to gain more in-depth knowledge about substance use and abuse were key components, with the theory that increased knowledge about the negative effects of substance abuse would necessarily deter adolescents' use. Much early research revealed that information dissemination was inadequate for the reduction of substance use in adolescence (for several examples, see Harmon, 1993; Kinder, Pape, & Walfish, 1980; Malvin, Moskowitz, Schaps, & Schaeffer, 1985; and Unlu, Sahin, & Wan, 2014). In fact, some found that increasing knowledge about substances and substance use actually increased rates of use (Botvin, Baker, Dusenbury, Tortu, & Botvin, 1990). While there is no clear evidence for reasons (and research in this area ceased when information dissemination programs stopped being developed and utilized), some have theorized that increasing knowledge also stimulated curiosity about using the substances. In all, information dissemination has fallen out of favor as a stand-alone technique based on the heavily negative empirical evaluation of it.

Fear Arousal

In an intuitive prevention strategy, a theory emerged that if an adolescent's fear about using substances were increased, he or she would be significantly less likely to actually use those substances. Techniques employed in these methods (which are often paired with information dissemination) include scaring adolescents from using tobacco, alcohol, and other drugs, based on dramatizing negative consequences (such as showing blackened lungs from cigarette smoking) or emphasizing worst-case scenarios (such as deaths from drunk driving). Although fear arousal techniques have been found to generate reactions in their audience, and may even contribute to some attitude change in some adolescents, overall they seem not to have any long-term deterring effects (Thrul, Buhler, & Herth, 2014). Even if they do increase adolescents' appraisal of the risk of using substances, this does not seem to affect their behavior in a positive way on its own (Sheeran, Harris, & Epton, 2014). As such, fear arousal techniques, like information dissemination as a stand-alone technique, have fallen out of favor.

Social Influence Models

In a first and groundbreaking break from the information dissemination and fear arousal models (which do not seem to work well, if at all), Evans (1976) pioneered a shift in focus from drug facts to psychosocial factors that contribute to substance use and abuse. He focused on an inoculation model, premised on the hypothesis that persuasive messages (from peers, the media, etc.) played a pivotal role in adolescents choosing to engage in substance use. The theory held that by exposing adolescents to "low doses" of persuasive messages, they could build up "antibodies," in the form of anti-drug attitudes, beliefs, and normative expectations, that would protect them in the future from exposure to further "doses" (which would naturally come from their environments in the forms of peer pressure, cultural exposure, media, etc.). Evans' model of preventing (or at least delaying) substance use was replicated and studied multiple times, with positive outcomes (e.g., Flay, 1985; Sussman et al., 1995), and many of the techniques developed in the social influence model are utilized in current, evidence-based comprehensive programs.

Ecological and Liability Models

The newer "wave" of prevention theories are much more comprehensive and based in cross-disciplinary theory and research. Specifically, they focus on the complex interplay between individual and context. Ecological models are based in the seminal work of Bronfenbrenner (1977) and subsequent work by Belsky (1993) focused

on the multiple, interconnected systems that influence an individual's behavior. Beyond just internal, individual factors (like genetics, personality/traits, etc.), many different levels of influence are at play, such as peer relationships, parent relationships, neighborhoods, schools, broader culture, and, perhaps most importantly, the interplay between all of these. The liability model (Tarter & Vanyukov, 1994) focuses on the interaction between individual vulnerability to addiction (which increases use and problems in adolescence) and environmental factors that contribute to the vulnerability being "triggered" into actual problem (versus those environmental factors that interrupt the vulnerability). Both models focus on the interplay between individual, personal characteristics (or vulnerabilities) and contextual and environmental factors. The ecological models focus on risk and protective factors at every level/system, as well as how they interact, strengthen, or mitigate each other, while the liability model focuses on how environmental and contextual factors either propel or reverse the trajectory from personal risk to actual addiction. Some examples of these contextual factors include deviant peers and low parental monitoring (Blackson, Tarter, Loeber, Ammerman, & Windle, 1996), but there are many personal and contextual/environmental factors that have been implicated. While more comprehensive prevention efforts should interact with all the systems, as well as both the personal and contextual/environmental factors associated with risk and protection, multiple models of prevention have emerged from these broader umbrellas, including risk and protective factor models, skills training models, normative education, and competence-enhancement models.

Risk and Protective Factors

The focus on risk and protective factors has permeated the theoretical and practical literature on prevention programming, as it has yielded some of the most positive and promising results. While some risks are genetic (Meyers & Dick, 2010) and not so amenable to psychosocial intervention, many are personal and either teachable or remediable (such as specific social and life skills), social, or cultural. Understanding those factors that pose risks for problems and those factors which protect youth against them directly informs prevention programming. A section of this chapter below will be dedicated to the discussion of risk and protective factors at these different levels.

Skills Training

Hearkening back to the work of Evans (1976), the primary tenet of skills training models for prevention is that early use of drugs and alcohol is dependent primarily on social influences, such as peers and media. The major skills that have been the focus of these models of prevention relate to resisting peer influence to use substances and resisting media influence that promote substance use (Hansen, 1992). The premise of these programs is that an increase in skills (seen as a protective factor) will decrease individuals' susceptibility to negative influences, and this premise

has fared well in the research literature (Sheeran et al., 2014). Many programs are built around skills training, and many comprehensive programs include skills development as a primary component.

Normative Education

It was observed fairly early that when asked, adolescents tend to significantly overestimate the prevalence of substance use among their peers (Evans, Hansen, & Mittlemark, 1977). This has been somewhat refuted more recently in the literature (Henry, Kobus, & Schoeny, 2011; Pape, 2012; Simons-Morton & Kuntsche, 2012); it has been found that those adolescents who are using substances tend to overestimate peer use, while those who are not using substances actually tend to underestimate. Regardless, the theory holds that youth should challenge any misconceptions about prevalence of use so as not to believe that it is more normative than it is. Adolescents should not believe that using substances is normative, harmless, or socially acceptable (or worse, a way to "fit in"), and normative education programs are based on ensuring that they learn about actual rates of use (along with some consequences of use).

Competence Enhancement

The competence-enhancement approach to prevention incorporates components of many of the above models, comprehensively addressing substance use as a socially learned and reinforced behavior (based on the work of Bandura (1977) and Jessor & Jessor (1977)), with those individuals with lower personal and social competence (operationalized most often as self-management and social skills) at highest risk for maladaptive coping strategies (Botvin, 2000). The theory posits that adolescents with better cognitive, affective, and behavioral coping skills to manage their everyday challenges are more likely to do so in a healthy manner, rather than turning to substance use to cope (which then becomes reinforced as it helps mitigate negative emotions). These goals are aligned with positive youth development, and increased personal and social competence has many benefits. However, to affect substance use specifically, these programs need to have substance-use-specific information, such as peer pressure resistance skills, normative education, and media resistance skills, such as those developed in the social influence model (Caplan et al., 1992).

Levels of Prevention

In 1994, the Institute of Medicine (Mrazek & Haggerty, 1994) proposed three levels of prevention, which they defined specifically as interventions that occur before the onset of a specific disorder (such as a substance use disorder). *Universal prevention* is the broadest form of prevention and is aimed at an entire population of

individuals, regardless of level of risk, "red flag" indicators of problems or potential problems, or any other distinguishing factor. These types of prevention efforts may be more aligned with public health initiatives, such as anti-drug mass media campaigns, which reach everyone equally. They may also take the form of broad educational initiatives, such as school-based prevention programs (like teaching general life skills) that are offered to entire schools, without singling any specific children out for different programming. These universal prevention efforts have been shown to be effective at improving multiple factors, especially at reducing cigarette use for those who receive the programs, and on a broader population level, they have been linked with lower rates of use of both cigarettes and marijuana (Shamblen & Derzon, 2009). Universal prevention has been shown to be most effective for those individuals who are at low baseline risk, having low risk factors, and not yet using any substances.

Selective prevention represents programs and initiatives aimed at subsections of populations, specifically those who are seen as being at higher risk for problems, such as substance abuse. Those youth with multiple individual risk factors (see section on risk factors later in the chapter) present, for example, could be separated out and provided with specific interventions targeting those risk factors (or increasing protective factors, etc.). While some selective preventions may look similar to universal prevention, aiming at increasing protective factors and mitigating risk factors, techniques that have been found to be effective for selective prevention include motivational interviewing with a harm-reduction framework (Catalano, Haggerty, Hawkins, & Elgin, 2011).

Indicated prevention is targeted toward individuals who are either already engaging in some high-risk behaviors, such as experimentation with substances, or who are showing warning signs of danger, such as dramatic change in behavior (these are considered "indicators" of potential imminent problems). Not yet meeting criteria for a specific disorder (such as a substance use disorder), these individuals need significant intervention to change the course of their problematic trajectory. Interventions for indicated prevention are much less general than universal prevention and even selective prevention, both which often focus on skill development. Interventions for indicated prevention are much more heavily focused on the problem indicators themselves, antecedents to those indicators, and outcomes that reinforce the negative behaviors. Both selective and indicated prevention efforts have been shown to be effective, most of all with problematic alcohol use (Shamblen & Derzon, 2009).

Strategic Prevention Framework

SAMHSA has developed a model for prevention work called the Strategic Prevention Framework (SPF; http://www.samhsa.gov/capt/applying-strategic-prevention-framework). This framework is especially important as it balances the use of

evidence-based prevention science approaches to preventing problems (including substance-related ones) with the understanding of several limitations to the prevention literature. First, much of the literature on prevention programs focuses on faithful implementation of specific programs by trained professionals leading to positive outcomes. While this is an ideal circumstance, most often in the real world, there are not enough resources to implement these programs in the same ways that they were developed and tested. Second, and perhaps more importantly, many of the prevention efforts were developed for and tested on populations that were seen to be high-need (if not high-risk) populations, such as school-based prevention programs tested in urban, high-minority schools. While many of the findings are likely to transfer somewhat easily to other populations, this assumption may not be entirely sound. In fact, one dimension of this, cultural adaptation of programs and interventions, has been found to be absolutely key in programs' success (Kucukuysal & Beyhan, 2011). Strategic prevention aims to balance the use of evidence-based techniques with the acknowledgement that implementing preventative interventions in a fully evidence-based way is not entirely possible.

The Strategic Prevention Framework involves five steps. First, a comprehensive assessment of the needs of the community/population is necessary. This assessment can include multiple methodologies toward better understanding the potential problem to be addressed, the risk and protective factors present within the community or population, and epidemiological trends within the community. Second, the framework requires the increasing of prevention capacity within the community/population itself. This step acknowledges that many situations will not allow for fully trained "experts" to come in and implement prevention programming in perpetuity. Capacity for making preventative efforts themselves must be built into the process with communities. Third, strategic plans for addressing the needs must be developed. These plans can be a collaboration between a prevention team and community/population members themselves, again working to address the needs that emerged from the assessment in as evidence-based a way as possible, with the acknowledgement that evidence-based programs and techniques may not fully apply to the population at hand. That is, tweaks (such as culturally-driven alterations) may need to be made in order to make programming most effective for the specific community. Fourth, the actual preventative interventions are implemented. These may include direct services (such as school-based workshops for adolescents), changes in policies and practices through consultation, and other interventions. Finally, fifth, the SPF requires the evaluation of outcomes, to ensure the effectiveness of the process as a whole, which then informs future prevention programming. The overarching guiding principles that are integrated throughout the SPF process are sustainability (the second step is especially important for this) and cultural competence (steps one and four lean most heavily on this). Strategic preventions have been shown to be quite effective, from small-scale programs within single schools all the way up to entire communities (for several examples, see Anderson-Carpenter, Watson-Thompson, Chaney, & Jones, 2016; Eddy et al., 2012).

Risk and Protective Factors

Much of the emphasis in the prevention science literature is on risk and protective factors related to the development of problems, such as substance abuse and substance use disorders. While some risk factors are difficult to assess and are invisible, such as genetic risk factors (Meyers & Dick, 2010), others are easier to evaluate and perceive, such as some temperamental factors (Ormel et al., 2012), interpersonal factors (Schindler & Broning, 2015), social and other life skills, and social, cultural, and environmental factors.

Periods of Risk

Periods within individuals' lives that are marked by transition have a long-standing place in the literature as periods in which these individuals are at higher risk for problems emerging (Griffin, 2010). During transitions, such as the transition from high school to college, the transition into parenthood, and getting married, individuals' coping skills are tested and challenged. Moving into significantly different environments (such as a switch of school or moving away for college), facing dramatically different responsibilities (such as parenthood), or having a significant change in support or life circumstances (such as after the loss of a spouse) requires individuals to manage more than usual amounts of stress, monitor and self-regulate their emotions and behaviors, and cope with things they are not used to, and these requirements place them at higher risk for maladaptive coping or being overwhelmed. For example, the transition to college can be quite a difficult one. Alcohol may offer several "benefits" to new college students: some may find socializing and making new friends easier with some alcohol in their system; others may feel they need to drink alcohol in order to "fit in" with new college peers; still others may simply be overwhelmed by stress, anxiety, and other emotions, and alcohol can serve to relieve some of the immediate symptoms of these. The traditional move to college from high school is a transition that brings with it social demands, emotional demands (often missing parents and certainly old friends and other social supports), and environmental demands (often new autonomy and the need to manage personal time and responsibilities significantly differently than before). Other transitions in life bring with them different demands, but all transitions come with some demands.

Adolescence represents one of these major transition periods, full of navigating new situations (including social situations, biological/hormonal situations, educational, behavioral, independence-related, identity development-related, and others) and extreme demands on the coping skills of individuals. Steinberg (2008) has done quite a bit of research on brain development through adolescence and early adulthood, which consistently finds development ongoing (thus not fully completed) in areas of the brain related to impulse control, emotion regulation, and behavioral regulation. New forms of social interaction, limit testing, searching for identity

(Marcia, 1966), and particular psychological phenomena unique to adolescents (such as feeling uniquely invulnerable to problems (Hill, Duggan, & Lapsley, 2012)) characterize this period as particularly transitional, and as stated previously, this is a period of particular risk for the onset of problematic substance use that can develop into substance abuse or a substance use disorder.

Individual Risk and Protective Factors

Many of the primary risk and protective factors that are the focus of prevention efforts are characteristics inherent to individuals, such as genetic factors, attitudinal and personality factors, developmental factors, and emotional factors (Swadi, 1999). Some examples include attitudes about drug use and expectancies, including level of knowledge about the risk of use and how normative individuals believe it is (Kandel, Kessler, & Margulies, 1978; Krosnick & Judd, 1982; Smith & Fogg, 1978). These are important cognitive factors that have been found to be associated with substance abuse risk, especially as they are easily addressed through psychoeducational means. More complex emotional and skill-related factors that have been implicated in substance abuse and addiction risk include capacity to regulate emotions and behaviors (Khantzian, 1997); to cope with stress, distress, and negative situations (Berkowitz & Begun, 2003; Botvin, 2000); and to resist social influence and be assertiveness (Berkowitz & Begun, 2003; Botvin, 2000). Importantly, more ingrained personality factors have been found to be related to risk for substance misuse, as well as to motivation for using and how reinforcing, and thus self-sustaining, substances themselves are (Comeau, Stewart, & Loba, 2001; Conrod, Peterson, Pihl, & Mankowski, 1997; Conrod, Pihl, Stewart, & Dongier, 2000; Conrod, Pihl, & Vassileva, 1998; Cooper, Frone, Russell, & Mudar, 1995; Woicik, Stewart, Pihl, & Conrod, 2009). While some have discovered personality trait links to substance abuse such as those related to self-esteem and risk for depression, anxiety, and antisocial behaviors (Armstrong & Costello, 2002; Cerda, Sagdeo, & Galea, 2008), Conrod and colleagues have found four specific characteristics extremely predictive of substance abuse and problem use: hopelessness, anxiety sensitivity, impulsivity, and sensation seeking (Conrod, Castellanos-Ryan, & Mackie, 2011; Conrod, Stewart, Comeau, & Maclean, 2006; O'Leary-Barrett, Mackie, Castellanos-Ryan, Al-Khudhairy, & Conrod, 2010). While understanding the genetic and biological risk factors may ultimately be useful in assessment and identification of individuals at risk, knowing these individual characteristics that are more amenable to intervention can not only aid in identification but also in understanding how best to intervene with individuals at risk.

Family, Peer, School, and Neighborhood Risk and Protective Factors

The direct contexts in which individuals operate have a strong influence on potential problems. Bronfenbrenner (1977) emphasized the importance of these *microsystems* in personal adaptation, noting just how important one's family, peers, school, and neighborhood are at any given moment. Indeed research has borne out many interactional factors that are related to substance abuse, particularly in youth. For example, Lochman and van den Steenhoven (2002) enumerate many of the family factors that seem to affect risk for substance use problems, including some directly related to substances, like direct modeling of use and family attitudes toward substance use, but also some more general family factors, like the harshness of disciplinary practices, the level of monitoring and limit-setting parents provide their children, levels of family bonding and open communication, and the general level of conflict within the family. Similarly, peer use and peer attitudes about use have been correlated with substance abuse behaviors (Mason, Mennis, Linker, Bares, & Zaharakis, 2014; Monahan, Rhew, Hawkins, & Brown, 2014), as have more general social factors like peer rejection (Cairns, Cairns, Neckerman, Gest, & Gariepy, 1988; Coie, 1990).

Multiple school-related variables have been implicated in risk and protection for problematic substance use. Included in these are attitudes that are affected by individuals, families, peers, and schools themselves, such as level of feeling engaged with school and how committed one is to school and academics (Fletcher, Bonell, & Hargreaves, 2008). Obviously many of these factors are multiply determined, such that personality characteristics, family values, the quality of school, and many other contextual variables will affect them. Ultimately, in addition to these emotional and attitudinal school variables, actual success or failure at school has been linked to risk for developing problematic substance use (Jessor, 1976; Smith & Fogg, 1978).

Community and neighborhood factors have also been implicated as influencing risk for problematic substance use. As would be expected, major problems in neighborhoods are related to higher risk for substance abuse and dependence. Included are a lack of safety, community disorganization, extreme population density and overcrowding, and physical infrastructure deterioration, as well as the more internalized feeling of being disengaged from one's local community (Hays, Hays, & Mulhall, 2003; Murray, 1983; Simcha-Fagan & Schwartz, 1986). The physical and emotional environment in which one lives can serve as a risk or protective factor, in addition to the social environment.

Sociocultural Risk and Protective Factors

Culture and broader societal factors, what Bronfenbrenner (1977) termed the *exosystem*, also have a significant role in risk and protection for substance-related problems. Some social factors that are more concrete have been found to be related to rates of substance abuse, including taxation of substances (Cook & Tauchen, 1982; Saffer & Grossman, 1987) and laws regulating substances and substance use, such as drinking age laws (Cook & Tauchen, 1982; Krieg, 1982; Saffer & Grossman, 1987). Related to laws and regulations is simply the availability of substances, another major factor implicated in rates of use and abuse (Gottfredson, 1987). Finally, major societal problems also play a role, such as extreme poverty and economic deprivation (Murray, Richards, Luepker, & Johnson, 1987; Robins & Ratcliff, 1978; Zucker & Harford, 1983).

In addition to concrete societal factors, "softer" cultural factors also play a role in risk of and protection from substance use and abuse. For example, more exposure to advertisements promoting alcohol use has been linked to higher rates of actual use (Atkin, Hocking, & Block, 1984). Ultimately, culture significantly affects attitudes, values, and expectations about what individuals can expect if they use substances (Abbott & Chase, 2008). Both structural and "softer" sociocultural factors play central roles in how at risk individuals are for using substances, using them early, and developing problems as a result.

Prevention Programs

Many prevention programs have been developed, and many have shown promise or even extremely good results. While this may sound exciting, a review of the landscape of actual practice in the real world revealed that the overwhelming majority of programs being implemented outside of controlled research protocols were not one of these evidence-based programs, or, if they were, very few were implemented faithfully or sustained over time (Ennett et al., 2003; Ringwalt et al., 2002; Spoth, Greenberg, & Turrisi, 2008). Clearly, there is a disconnect between research and practice in the field, and while practitioners need to understand the empirically-driven basis for successful programs, researchers need to understand the practical limitations to implementing programs outside of highly structured (and often grant-funded) research protocols. This section provides a brief review of many of the programs that have proven successful in research, and the following section presents principles that have emerged from these successful programs that may be more easily integrated into actual prevention programming in the real world, when and if entirely faithful implementation of one of the evidence-based, empirically-proven programs is not feasible.

School-Based Prevention Programs

The literature and development of prevention science have focused quite a bit on schools as a primary and appropriate setting for programming, as they occupy a great deal of adolescents' waking lives, as well as having the explicit mission of educating youth, which is in direct opposition to substance use (and certainly problematic use and abuse). Additionally, there are many common goals of prevention programs and educational institutions, such as improving decision-making skills and impulse control in general, at which substance abuse prevention programs have proven extremely successful (Pokhrel et al., 2013).

Many school-based programs have been developed, and many have been found to have beneficial effects on children. Across many meta-analyses, it appears those programs that teach social competence, including resistance to social influence and other social skills both generally and substance-use-specific, are the most effective at preventing taking up smoking cigarettes (Hwang, Yeagley, & Petosa, 2004; Thomas, McLellan, & Perera, 2013), though there is not much evidence for long-term effectiveness of any school-based programs (Wiehe, Garrison, Christakis, Ebel, & Rivara, 2005). These findings are consistent with school-based skill-building programs being most effective at reducing both marijuana and other illicit drug use (Faggiano et al., 2008). Information-based and affective programs have not had the same success (Faggiano et al., 2008; Thomas et al., 2013). When it comes to alcohol prevention, although stated goals are often to delay the onset of use, school-based programs are much better at decreasing rates of heavy use, such as drunkenness and binge drinking, though many have been shown to be effective at improving alcohol attitudes, expectancies, and use (Foxcroft & Tsertsvadze, 2011). Importantly, while there is some evidence of brief school-based interventions, especially based on motivational enhancement techniques (Hennessy & Tanner-Smith, 2015), there is no evidence to suggest that these brief interventions are effective if administered in group formats (which is primarily the case in school-based prevention programming), and there is much more evidence that longer programs (more than a year) and those with booster sessions in following years are more effective (La Torre, Chiaradia, & Ricciardi, 2005; Thomas et al., 2013). Programs that target multiple theoretical factors hypothesized to impact the onset of substance use seem to be the most effective, as well (Porath-Waller, Beasley, & Beirness, 2010). Some newer research is supporting the use of school-based computer or internet-implemented prevention programs, with some showing decreases in alcohol and drug use and increases in knowledge and intentions not to use in the future (Champion, Newton, Barrett, & Teesson, 2013; Champion, Newton, Stapinski, & Teesson, 2016).

Family-Based Prevention Programs

While, theoretically, family-based interventions for the prevention of substance use and abuse make intuitive sense, the actual findings on program effectiveness has not been as promising. Most programs aimed at families attempt to improve parenting practices, including increasing parental monitoring of children, improving behavior management techniques and clarity of boundaries, and increasing support, nurturance, and family cohesion. Studies have found some positive effects of these programs in the short- and medium-term, but these effects tend to be extremely small and may not actually influence initiation of using substances (Foxcroft & Tsertsvadze, 2012; Kuntsche & Kuntsche, 2016). Similarly, some benefits were found in programs focused on parental involvement and explicit parental disapproval of substance use, though some programs that targeted only parent behavior actually saw increases in adolescents' substance use (Petrie, Bunn, & Byrne, 2007). Youth- and individually-focused programs, even if focused on improving family interactions, seem to be much more effective at curbing problematic substance use, especially over time (Tripodi, Bender, Litschge, & Vaughn, 2010; Van Ryzin, Roseth, Fosco, Lee, & Chen, 2016). It is important to note that a major hurdle in family-based prevention efforts is that those families who are at the highest risk and have the most need are the least likely to participate in these kinds of programs (Diaz et al., 2006).

Workplace Prevention Programs

The workplace is in many ways an ideal place to implement universal prevention efforts to attempt to reduce alcohol and drug misuse, as workplaces can reach an extremely broad audience (many of whom may not be reached by other methods) and reducing alcohol and drug misuse benefits both the employer and the employees. Workplace prevention can include the use of work policies that attempt to change attitudes toward alcohol and other drug use (Liira et al., 2016), including strict policies and limiting access to alcohol (Ames & Bennett, 2011), which have been shown to be promising tactics, as have larger social norm-targeting campaigns (Frone & Brown, 2010). Most, though, focus on general health promotion and healthy lifestyle education (Bennett & Lehman, 2003; Cook & Schlenger, 2002). It should be noted that the field of workplace prevention programs is quite young, and while studies have found some workplace prevention efforts to be successful, there are no long-standing and well-established (and thus thoroughly studied) programs, so even promising results are quite tentative. The most promising to date seem to be programs that integrate alcohol interventions with health promotion, combining education, assessment, and brief interventions (Ames & Bennett, 2011). An intensive, 2-day intervention aimed at promoting healthy behaviors (including information about alcohol and cigarette use) and even a brief, targeted intervention focused

on making healthy life choices and encouraging seeking professional help seem promising for reducing alcohol use (though not cigarette smoking; Reynolds & Bennett, 2015; Spicer & Miller, 2016).

In addition to universal prevention in the workplace, programs often focus on screening and selective and indicated prevention efforts in order to curb the escalation of problematic substance use (Liira et al., 2016). For example, the Alcohol Screening and Brief Intervention (ASBI) model, which has been applied extremely successfully (and cost-effectively) in primary healthcare settings to reduce harmful and hazardous alcohol use (O'Donnell et al., 2014), has been applied in workplace settings, with varied success (Schulte et al., 2014). It is likely that the varied success has to do with the extreme heterogeneity of cultures and contexts in the workplace, as opposed to the relative homogeneity of the primary healthcare setting. Additionally, although theoretically an online approach to workplace prevention makes sense, to increase privacy and mitigate the potential effects of stigma, research has not provided much evidence of the effectiveness of online prevention programs administered at work (Khadjesari, Freemantle, Linke, Hunter, & Murray, 2014).

Community-Based Prevention Programs

Of all the different types of prevention programs, community-based programs are the most difficult to study, as most of them include multiple varied components, often including family- and school-based ones. The most promising community-based prevention programs seem to incorporate a coordinated, targeted "message" across all of their different components. Some program components have included education for primary care physicians and community partners, community activation and coalition building, collecting and monitoring of data, policy work, mass media campaigns, and public relations work, among others (Albert et al., 2011; Clark, Wilder, & Winstanley, 2014; Gripenberg Abdon, Wallin, & Andreasson, 2011). It should be noted that these multicomponent, community-based preventative interventions are often quite cost- and labor-intensive.

Specific multimodal, community-based prevention programs have shown promise for discouraging the sale of alcohol to intoxicated individuals, which included law enforcement efforts, skills training, information campaigns, and policy work (Warpenius, Holmila, & Mustonen, 2010), and lowering rates of uptake of cigarette smoking in children and adolescents (Sowden & Stead, 2003). Some of the most effective and promising community-based prevention programs help guide communities through a specific and explicit process of identifying needs and resources, selecting community leaders, creating an action plan with clear goals and objectives, and selecting evidence-based programs and policies (Hawkins et al., 2012). In all, however, large-scale community-based prevention efforts are difficult to evaluate as a single construct, as they are so heterogeneous and often have many varied components.

Prevention Science-Based Principles

As stated previously, it is often the case that, in practice, prevention programming cannot adhere faithfully to the models that have proven effective in the research literature, for a variety of logistical reasons. As such, it is important to extract some of the most salient and important "lessons" learned from evidence-based prevention programming, to guide practitioners in what is most likely to be effective in the real world.

Goals of Prevention

Prevention programs seem most effective when they are well coordinated and take aim at specific, evidence-based goals. As information dissemination and fear arousal tactics have been found to be ineffective (and worse, potentially harmful), programs should focus on enhancing social and psychological (coping) competencies, mitigating risk factors, and improving protective factors (including family cohesion and school connection) in youth. Because cost is often a primary factor in the decision-making process, the Strategic Prevention Framework paradigm can be particularly useful in assessing the *greatest* needs (competencies, etc.), as well as the easiest-to-target goals for a particular population. While conducting a comprehensive needs assessment may seem costly, targeted interventions that emerge from the assessment provide a more-bang-for-your-buck alternative to comprehensive programming, which is time-, cost-, and labor-intensive. If an evaluation reveals that a specific population's greatest risk factor lies in disconnection from school, decision makers can use evidence-based models for improving school connectedness in adolescents, rather than creating comprehensive programming to address all social and psychological skills and competencies. Comprehensive, long-term programming seems to be the most effective overall, but pragmatic limitations preclude many communities from delivering this kind of prevention effort.

Developmental, Cultural, and Contextual Appropriateness

Because there are different risks for different problems at different ages, it is important to understand developmental factors related to prevention programming. It is unlikely that the uptake of alcohol, cigarette, or drug use will happen early in the elementary school years. Therefore, programming at this age should be universal and target the known *eventual* risk factors for the initiation of problem behaviors, such as improving social competencies. Later in adolescence and the high school years, though, it may be more appropriate to evaluate groups of individuals for potential selective intervention and focus more on substance-specific skills, such as

normative education and peer refusal skills. It is important to be deliberate about the risks, protective factors, and competencies that are being targeted at different developmental levels.

Similarly, multiple researchers have found that adapting programs is necessary for contextual appropriateness (Colby et al., 2013). Different cultures respond to different interventions in specific ways, in addition to potentially having different risk and protective factors (see, e.g., Castro et al., 2006). Researchers have found that, at the very least, culturally-specific adaptation of prevention programs tends to lead to more satisfaction with the programs and more personal meaning and identification with the content of them, and for some that translates into greater effectiveness (Springer et al., 2005). Adapting programs successfully should take into consideration both surface-level changes, such as names used in examples, and deep-level changes, such as truly understanding and addressing the culture-specific normative attitudes and beliefs or motivations of a specific group (Gewin & Hoffman, 2016).

Targeting Risk and Protective Factors

It is clear that the most promising programs for deterring onset of substance use and problematic misuse focus on risks and protective factors, including building competencies. In fact, the most successful programs seem to target multiple different risk and protective factors, from genetic to sociocultural factors (Scheier, 2010). Whenever possible, programs should evaluate and target the factors that are likely to provide the greatest support for the individuals involved (at least as much as is possible). Comprehensive and multicomponent programs seem to hold the most promise for "tackling" the most different factors, though of course these programs are often cost-, time-, or labor-prohibitive. Building competencies and protective factors and mitigating any salient risk factors, though, should make some impact on the population being targeted.

Practical Issues in Prevention Programming

A number of pragmatic issues can improve (or derail) the effectiveness of prevention programs. One of the most common ones to be investigated is fidelity, how faithfully and precisely an evidence-based program is delivered in real life. If a program has been proven to be effective in a specific format, that format should be respected and replicated as closely as possible, in order to maximize the likelihood of replicating its effects (Botvin, Baker, Dusenbury, Botvin, & Diaz, 1995; Durlak & DuPre, 2008). Failure of a poorly replicated program to produce positive effects cannot easily be linked to program ineffectiveness, poor fit with the population, or any other explanatory model, simply because the program is not the same program

that was evaluated in the research literature. This principle is not meant to preclude the deliberate adaptation of programs for specific purposes, but it warns against sloppiness and poor attention to detail in the delivery of programs.

Some specific practical application issues have emerged as potentially extremely useful in prevention programming. For example, many have found that booster sessions in years after the main preventative intervention help the effects of the initial intervention last longer and be more effective (Resnicow & Botvin, 1993). Additionally, similar to general educational techniques, interventions that are specifically more interactive have proven more effective (Tobler & Stratton, 1997). Even when full program fidelity is not feasible in a given setting, some of these smaller, more practical aspects that have been shown to be more effective in prevention programming can be implemented for increased likelihood of program effectiveness.

Conclusion

There is a great deal known about prevention of substance use, substance abuse, and substance use disorders; however, there is often a disconnect between what is known and what is actually enacted in communities, agencies, and other practice settings. One major problem is the difficulty implementing evidence-based programs either in their entirety or faithfully, given pragmatic constraints. However, principles learned from prevention research can help actual programs increase the likelihood of effectiveness.

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