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PUBLIC COMMUNICATION FOR DRUG ABUSE PREVENTION

A Synthesis of Current Meta-Analytic Evidence of Message Efficacy

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Introduction: On the Efficacy of Public Communication for Drug Abuse Prevention

Much of the effort to address the enormous social problem of drug abuse and addiction has aimed to prevent initiation of and experimentation with drug use. Given the pernicious nature of the development of addiction and the challenges of treating it, many have taken the opinion that an ounce of prevention is worth a pound of cure. This emphasis is typical in interventions related to drug abuse in the mass media and classroom. Public drug abuse interventions, by which we refer to those outside of a clinical context, have focused overwhelmingly on prevention, especially among young people. Today's youth are exposed to a wide variety of antidrug messages which are widespread in public education and in various media, especially television. Though few question the legitimacy of the aims of public drug abuse interventions, some have strongly criticized their results and questioned whether they justify their expense, which is often publically funded (e.g., McCambridge, 2007; Werb et al. 2011). Establishing whether interventions are generally effective and why they succeed or fail is critical for determining whether and how they should be done. Accordingly, an impressive cumulative body of empirical research has addressed the fundamental question; do antidrug messages work?

Early Efforts: Were Many Interventions Failures?

However laudable the aims of drug abuse prevention interventions, such efforts have a "rather checkered history," as noted by Alan Leshner (2002), then director of the National Institute on Drug Abuse. "The 'reefer madness' of the 1930s and the 'scare tactics' of the 1970s ... have not always met expectations as effective

drug prevention tools. In fact, research on the drug information campaigns of the 1970s found little evidence of media effectiveness in preventing drug abuse" (p. ix). Worse, inefficacy is not the greatest fear when implementing a public drug prevention intervention. More worrisome is that intervening might sometimes engender outcomes worse than doing nothing. Regarding early efforts, there has been widespread scholarly concern that mass media drug prevention messages might sometimes have done more harm than good (Crano & Burgoon, 2002). The often exaggerated and melodramatic content may have undermined source credibility, and content may also have given the impression to young people that drug use is more common and accepted than it is (for related concerns, see Albarracín, Cohen, & Kumkale, 2003; Cialdini, 2003). Sometimes messages might also backfire by arousing curiosity about drugs (Wagner & Sundar, 2008). Another concern is psychological reactance (Brehm, 1966). Blatant interventions may threaten an audience member's sense of autonomy and evoke greater desire to engage in experimentation with drugs precisely because of pressure not to. Due to the scarcity of early research, we will likely never be entirely certain of the impact of prevention messages from the middle decades of the twentieth century. Subsequent research has certainly affirmed that perceptions of the normativity of drug use, especially among peers, are important predictors of related drug and alcohol attitudes and behavior (e.g., Bentler & Speckart, 1979; Borsari & Carey, 2001; Fishbein et al. 2002a; Hansen & Graham, 1991; Prentice & Miller, 1993). In addition, pitfalls to successful intervention extend beyond message content and relate to deficiencies in exposure. For example, Hanneman and McEwan (1973) content analyzed antidrug public service messages and found that none were broadcast during primetime, and nearly half were broadcast between 10:00 a.m. and 3:00 p.m., when audiences, especially the critical young ones, are small. At any stage of the persuasion process—exposure, attention, comprehension, yielding, and recall—something could easily go wrong. Perhaps the early struggles of antidrug campaigns were to be anticipated given the inherent challenges of prevention. Campaigns compete with other sources of information about drugs that may depict them more favorably, and drugs often acquire the allure of the forbidden. It is worth keeping in mind that the problem is a hard one and modest expectations for efficacy are probably appropriate.

Current Status of Interventions

Public intervention efforts to reduce drug use and abuse continued and tactics evolved over the decades, based on lessons from successes and failures. In particular, a reversal in the decline of adolescent drug use in the 1990s spurred a massive investment in public drug prevention research (see Crano, 2002). Now, there is an impressive body of empirical research showing numerous successes and failures of public drug-prevention efforts. Considerable evidence indicates that interventions can have positive though typically small effects, but null and negative

“boomerang” effects are unfortunately also common. For example, testing thirty antidrug PSAs produced by Partnership for a Drug Free America, Fishbein and colleagues (2002b) found that compared to a control message unrelated to drug use, sixteen PSAs reduced adolescents’ intentions to use drugs, six *increased* them, and the remaining eight did not differ from control. This result is not unusual. Despite the much greater recent availability of empirical data, the question remains: When are public service interventions for drug prevention effective, and what accounts for their success?

The Present Chapter

In this chapter, we examine the efficacy of drug-prevention efforts presenting a narrative review of the available meta-analyses in this domain. Given the vast and often conflicting literature on the subject, drawing conclusions on the efficacy of drug prevention interventions can be a considerable challenge, as is evident in many narrative reviews emphasizing the inconclusiveness of the findings. The technique of meta-analysis, however, enables quantitative integration of very large numbers of participants across numerous studies and can shed some light on the robustness and variability of effects. There are several meta-analyses available, and we will find that we might draw somewhat different conclusions depending on our focus. However, more striking than the differences are the similarities, and we will see a general consensus regarding the average efficacy of public drug prevention interventions. We will discuss this evidence and assess interventions in terms of social psychological theory. Because we are interested in the bottom-line efficacy of drug prevention interventions, we will focus on observed standardized effect sizes for behavioral outcomes. That is, all effect sizes can be interpreted in standard deviation units of the outcome.

We excluded research examining interventions for cessation alone and those conducted in a clinical context. We included reviews of interventions to prevent the use of alcohol and tobacco as well as illegal drugs. We conducted a search in multiple databases including MEDLINE, PsycINFO, and Google Scholar using the following search terms: (prevention or initiation or abuse) and (antidrug or drug or illicit or tobacco or cigarette or marijuana) and (communication or appeal or intervention or message or public service announcement or PSA or intervention) and (meta-analysis or quantitative review). The references of all articles obtained were examined for further meta-analyses not identified by the search.

Types of Public Antidrug Interventions

In addition to discussing overall efficacy, the present chapter is primarily concerned with reaching conclusions as to the setting, intervention source, and audiences that maximize efficacy. For example, with respect to setting we compare mass media with school delivered interventions to gauge which settings are most

likely to bring success. Mass media interventions refer to public service announcements and other drug prevention messages communicated through mass media, especially television. These programs often entail persuasive messages from sources thought to appeal to target audiences, such as celebrities. Or, they take the form of narratives. Both aim to communicate potential negative consequences of drug use. Some recent research suggests that in health interventions the same content is more effective when presented in narrative form (Murphy, Frank, Chetterjee, & Baezconde-Garbanati, 2013), though further research is necessary to establish the generality of this finding to this domain. Mass media interventions differ from school-based interventions in many ways. They are typically much shorter, though they may have repeated exposures. School-based interventions take place in the classroom and typically involve didactic instruction about drugs, from a teacher or other authority figure, such as a police officer. By virtue of having a captive audience, school-based interventions have an advantage in ensuring exposure and at least a minimal degree of attention, which mass media interventions cannot take for granted. Another potential advantage is that it is easier to tailor school-based interventions at a group-level. Research on drug use initiation points overwhelmingly to the influence of peers as the primary determinant of initiation (e.g., Borvin & Griffin, 2007). School-based interventions can aim to associate group identities (e.g., sports teams) with antidrug beliefs. Meta-analyses have been conducted separately on each type of intervention, allowing an assessment of their relative efficacy. However, more research has been conducted on school-based interventions, which for obvious logistical and pragmatic reasons are easier to assess. Thus, other questions about relative efficacy will out of necessity focus on evidence from school-based interventions.

The Meta-Analytic Evidence on the Efficacy of Public Programs to Prevent Drug Use and Abuse

Modern meta-analytic methods did not become widespread until the 1980s, and two of the first syntheses of school-based drug prevention programs appeared in 1988. For scholars and practitioners hoping for definitive answers, the contradiction between these two articles marked an inauspicious beginning for quantitative review of the efficacy of public drug prevention interventions. Bangert-Drowns (1988) reported that drug abuse education was overall unsuccessful in changing the drug abuse behaviors of students, but had more positive effects on knowledge and attitudes. Rundall and Bruvold (1988) reported that for both tobacco and alcohol, drug abuse prevention education had modest positive effects on behavior and sizable effects on knowledge, but that attitudes were less prone to change. The differences between the two meta-analyses can be attributed primarily to differing eligibility criteria (including which substances were targeted) and the reliance on small samples of studies compared to many later meta-analytic efforts. Thus, we will focus on insights from more recent meta-analyses that were able to

incorporate results from the boom period of the 1990s, are more comprehensive, and cover the more extensive set of techniques available in recent decades.

Attitudes, Beliefs, and Behavior

Regarding the question of the relative malleability of behavior compared to other outcomes, health-promotion campaigns that successfully change attitudes and knowledge without changing behavior are typical. For example, a meta-analytic study of condom use campaigns consisting of a relatively simple message or set of messages (without the use of more complex techniques such as client tailored counseling) led to a similar conclusion. In this analysis (Albarracín et al. 2005), knowledge and attitudes changed $d = 0.52$ and 0.10 in treatment groups vs. $d = 0.08$ and $d = -0.05$ in no-message control groups, whereas condom use changed $d = 0.06$ in treatment groups vs. $d = 0.04$ in the control groups. Subsequent research on drug prevention interventions would confirm that average effect sizes from the meta-analyses that address knowledge outcomes are often more impressive than the more conclusive behavioral outcomes. For example, Tobler and Stratton (1997) obtained effect sizes of .37 and .38 for non-interactive and interactive interventions (e.g., health education vs. behavioral skills training) on knowledge outcomes, and indicated that originally standard “knowledge-based” intervention types (e.g., health education) were indeed successful at improving knowledge (see also Bruvold, 1993) but not behavior. Virtually all interventions attempt to influence knowledge about drugs and attitudes towards drugs, but many (especially more recently) also encourage the development of general skills not directly related to drug use or attempt to foster high self-esteem. Thus, interventions may have other positive effects that are not necessarily evident on usage measures, and a fair critical appraisal of their overall utility from a cost-benefit standpoint should incorporate all outcomes. Nevertheless, the similarity of conclusions from multiple domains renders confidence in the syntheses conducted regarding the challenge of altering behavior and also emphasizes the need for *harder* behavioral and biological endpoints for both pretesting and testing interventions lest their potential impact be overestimated. From this point on we focus exclusively on drug use outcomes, deemphasizing changes in knowledge and attitudes, as those changes do not translate well into behavior change. It is not clear exactly why this is the case. It may be that positive intraindividual changes in attitudes and beliefs are frequently overwhelmed by social influence.

Delivery Setting: Mass Media and School Based Interventions

Regarding mass media interventions, Derzon and Lipsey (2002) described their meta-analysis of mass media interventions on youth substance use as the first meta-analytic review of its kind, and we were unable to identify an earlier one. The synthesis included studies on interventions delivered in field or research

settings and conveyed via print, audio, video, or electronic media. The majority of studies evaluated campaigns using multiple messages with repetition broadcast to the general public, primarily on television, though often in combination with other media. They reviewed 110 reports from seventy-two separate studies, including forty-eight samples that included a measure of pretest and thus allowing for the calculation of effect sizes in terms of pre-to-post change in substance-use behavior, attitudes, and knowledge. Behavioral outcomes displayed a modest positive effect of media interventions ($\Delta = 0.04$ standard deviations), with small gains evident across all types of media. Some message characteristics were associated with better results, particularly messages that aimed to influence behavior by addressing parents and retailers or encouraged positive recreational alternatives to drug use. Finally, efficacy also varied as a function of gender (males changed more than females) and substance addressed, with relatively positive outcomes for alcohol and tobacco but lesser effects for "illicit drugs" (e.g., cocaine, methamphetamine). Overall, however, effects on behavior appeared positive and were statistically significant, and represented a 1 to 2 percentage point reduction in drug use (Derzon & Lipsey, 2002). Despite being meager, this effect may signal a welcome short-term outcome by realistic standards (Derzon & Lipsey, 2002).

A broad meta-analysis on the effects of mass media public health campaigns in the United States was conducted by Snyder and colleagues (2004; see also Snyder & Hamilton, 2002). In addition to drug prevention campaigns against alcohol use and smoking, the researchers examined behavior change in the domains of oral health, heart disease prevention, seat belt use, and cancer screening. This synthesis affords a unique opportunity to examine the effects of drug prevention campaigns relative to other public service efforts. Snyder and colleagues identified four eligible campaigns discouraging alcohol abuse ($n = 7,805$) and seventeen antismoking campaigns ($n = 79,629$). Again, small but significant effect sizes in the desired direction were observed for alcohol (0.09) and smoking (0.05). Treating only smoking as an addictive behavior, they argued that the average campaign impact was lower for addictive than nonaddictive behaviors and lower for behavior cessation than prevention. Adoption campaigns for seat belt use (0.15) and oral health behaviors (0.13) were especially effective, whereas those encouraging mammography were not (0.04).

The final meta-analysis of mass media drug prevention messages we could identify examined youth-directed mass media campaigns targeting improvements in behavior and behavioral intention in the area of illicit drug use (i.e., excluding alcohol and tobacco) exclusively (Werb et al. 2011). Two meta-analyses were conducted, one of randomized controlled trials and another for all other designs, though both had small numbers of eligible studies by meta-analytic standards. For randomized controlled trials, the average effect size did not differ significantly from zero. For observational studies, there was a small but significant average effect size (.04) in the direction of substance use reduction, corresponding to a 4 percent decrease in the use of illicit drugs. Despite the latter finding, the authors

emphasized that most observational studies nonetheless produced non-significant results, and given the lack of observed efficacy in the more stringent, experimental studies, drew very pessimistic conclusions about the efficacy of intervention campaigns.

As very few meta-analyses have addressed the efficacy of mass media campaigns for drug prevention, more work integrating these findings appears warranted. In summary, the available meta-analytic evidence mostly supports a very small positive effect of mass media drug prevention interventions, and the syntheses unanimously suggest high heterogeneity stemming from uninvestigated sources. The mild optimism that these meta-analyses engender might be further mitigated by the possibility of publication bias leading to limited publication of null or negative results, a critical aspect not assessed in these prior reviews (see McCambridge, 2007 and replies). Thus, despite integrating large amounts of research, meta-analysis has as yet done little to clarify whether (and, if so, why) drug prevention mass media campaigns are effective. We now turn to the much larger body of meta-analytic evidence on school-based drug prevention campaigns.

The meta-analytic evidence also consistently indicates small observed reductions in drug use behavior following school delivered interventions. In an analysis of experimental and quasi-experimental designs, White and Pitts (1998) reported that only fifteen of fifty-five school-based interventions produced a statistically significant effect on substance use. Although these researchers did not report an omnibus effect size, their meta-analysis of the studies they categorized as methodologically superior observed effect sizes of .04 for follow-ups of up to a year and .02 for longer follow-ups. Two meta-analyses exclusively addressed the Drug Abuse Resistance Education (DARE) program and obtained small but positive effects ($d = 0.06$ in Ennett & colleagues, 1994), and $d = 0.05$ in a more comprehensive synthesis by Pan & Bai, 2009). One of the larger meta-analyses, (Wilson et al. 2001) included a wider variety of school-based interventions for alcohol and drug use and reported a mean effect size of .04 based on 103 effect sizes. In another large meta-analysis including ninety-four studies of varied school-based interventions on alcohol and other drugs (excluding tobacco), Gottfredson and Wilson (2004) reported a range of effect sizes for subsets of studies ranging from 0.02 to 0.08 (excluding the 0.20 observed for interventions led by peers without teacher presence based on only eight effect sizes).

A few meta-analyses of interventions delivered in schools obtained somewhat more encouraging results for behavioral outcomes, although most focused on a narrower topic. A meta-analysis of drug prevention programs aimed at adolescents of color (Bledsoe, 2002) obtained a mean effect size of 0.16 based on twenty-nine effect sizes. This meta-analysis found little support for the hypothesis that a tailored cultural component increased efficacy, but revealed that including refusal skills training did increase efficacy. A meta-analysis of school-based anti-smoking programs (Rooney & Murray, 1994) also obtained respectable (but still small) effects at immediate and long term follow-ups ($ds = 0.11$ and 0.10), as

did a meta-analysis of twenty-two school-based drug prevention interventions conducted in rural settings ($d = 0.11$, Hendricks-Brown et al. 2007). Lastly, an unusually large average effect size of 0.58 was reported for a set of fifteen effect sizes from separate studies of school-based anti-marijuana interventions (Porath-Waller et al. 2008). However, the fifteen effect sizes were highly variable (i.e., ten of the fifteen were 0.06 or less.), and one effect size outlier (from Borvin et al. 2001), calculated to be 2.91, far exceeds even the most optimistic expectations for efficacy, and is much larger than effect sizes for other subsets of the data from the study by Borvin and colleagues (2001) included in other meta-analyses (e.g. 0.24, Soole et al. 2008). Finally, the most comprehensive meta-analysis (Tobler et al. 2000) of school-based programs, described in further detail below, obtained a mean effect size of 0.12.

In conclusion, the numerous meta-analyses of school-based drug prevention interventions have shown very small to small efficacy, and overall more promising results than those from mass media interventions. One reason for optimism is that although these effect sizes are small, publication bias does not appear likely to be able to account for the nonzero average effect sizes. Although many of the syntheses fell short of best meta-analytic practices (seeking unpublished results, statistically examining publication bias), others provided some evidence against misleading publication bias. For example, in the most comprehensive meta-analysis including 207 programs (Tobler et al. 2000), the mean weighted effect size was .12. Given a fail-safe N statistic, another 273 programs with null results would be necessary to reduce that effect from 0.12 to 0.05 (Tobler et al. 2000). This result provides confidence in the efficacy of these programs given that $d = 0.05$ can be both statistically as well practically significant. Further, in two of the reviewed syntheses (Wilson et al. 2001; Gottfredson & Wilson, 2003), the authors not only obtained respectable numbers of unpublished results but found that, to their surprise, the published studies obtained lower effect sizes than did the unpublished studies. Furthermore, although the typical effect of a school-based drug prevention intervention can be categorized as less than small by Cohen's (1977) standards (.2 being small), that typical effect is probably nonzero, is not necessarily trivial, and will likely grow in future interventions that benefit from the current knowledge base. Regarding this latter possibility, it would be reassuring to see that effect sizes have already increased over time. Unfortunately, the only meta-analysis to report analyses based on year of intervention or publication was limited to DARE programs and furthermore observed statistically homogeneous results, thus not suggesting results have improved over the decades (Pan & Bai, 2009). Nonetheless, potential improvements in intervention techniques may be masked by a failure to implement best practices as indicated by research outcomes (Ennett et al. 2003) and it does appear that more recent intervention techniques are more effective, which will be subsequently addressed in the section concerning intervention content.

Across the meta-analyses we reviewed, the overall efficacy of mass-media interventions was uniformly very low, roughly $d = .05$ on average. Meta-analyses

of school-delivered interventions demonstrated a greater range, and roughly averaged $d = .09$. These estimates should be interpreted with considerable caution, but it appears to be school-based interventions for which more and better evidence for efficacy has been provided. Arguably, this could be anticipated given the inherent challenges of mass media interventions, which by necessity are typically brief and must contend with problems of exposure that school-based interventions must not. The apparently greater efficacy of school-delivered programs also seems comparable to what is observed in the domain of condom use interventions (see Albarracín et al. 2003, 2005). An analysis of condom use promoting interventions that excluded active techniques such as behavioral skills training revealed a small degree of change ($d = 0.13$), barely larger than the degree of change observed in control groups ($d = 0.08$); $QB(1) = 4.18, p < .05$. However, behavior change in interventions delivered in schools was $d = .37$, which is sizable. Thus, these results suggest that modeling drug-prevention programs after condom use prevention programs may be a good avenue to maximize results in the future.

It is also worth noting that another setting for public health interventions has begun to gain traction: the Internet (for reviews, see Copeland & Martin, 2004; Marlatt & Witkiewitz, 2010; Ybarra & Eaton, 2005). An online setting has a number of potential advantages including anonymity, self-pacing, and self-direction. Unfortunately, there is currently no meta-analytic evidence regarding the efficacy of drug prevention interventions implemented online. In fact, very few extant studies have addressed drug prevention per se as opposed to cessation, and it will be interesting to see how such programs fare in the future. One possibility is that mass media interventions can work in conjunction with online interventions and that their goals will include encouraging audience members to seek out online interventions.

Intervention Content and Sources

Probably the most influential meta-analytic work on the efficacy of school-based drug prevention is a series focusing on content and delivery moderators conducted by Tobler and colleagues. The original synthesis was conducted by Tobler (1986) and was revisited, expanded, and reanalyzed repeatedly over the years (i.e., Tobler, 1992, 1993; Tobler & Stratton, 1997; Tobler et al. 1999; Tobler et al. 2000). We will focus on the most recent and largest meta-analysis, noting that the greater body of findings reported by this group is quite cohesive. Tobler and colleagues (2000) incorporated results from 207 school-based drug prevention programs, comparing “interactive” and “non-interactive” interventions. Non-interactive interventions (e.g., most DARE implementations) are didactic in nature, typically aiming at intraindividual changes in cognitive or affective responses towards drug use, sometimes involving participation (e.g., question and answer session) with the teacher or an adult source but no peer-to-peer activity. Interactive interventions utilize structured group discussions and peer-to-peer activities, and have over

time comprised an increasingly large proportion of the available interventions (see Tobler et al. 2000). In Tobler et al.'s (2000) synthesis, weighted effect sizes for the interactive programs (.15) were larger than for non-interactive programs (.05). Other meta-analyses have also supported the hypothesis that interactive interventions, in which recipient participation is not limited to the passive role as audience, are associated with better outcomes (Hansen, 1992; Soole, Mazerolle, & Rombouts, 2008; Ennett et al. 1994). In addition, traditional knowledge-based approaches are inferior to the more recent, interactive ones (Bruvold, 1993), and peer-led interventions appear more effective than those led by teachers (Cuijpers, 2002; Faggiano et al. 2008; Gottfredson & Wilson, 2003; Porath-Waller et al. 2010; Rooney & Murray, 1998).

These results have interesting parallels with the literature on similar condom use promotion interventions. For example, the school-delivered programs included in Albarracín et al.'s (2005) meta-analysis included both passive (not including client tailored counseling or behavioral skills training) and active (including client tailored counseling or behavioral skills training) approaches. Various forms of active techniques (e.g., self management training, $d = 0.51$) were responsible for the behavior change obtained in school interventions, but so were normative arguments describing how many kids engage in protection behavior. With respect to the use of professionally trained experts or peers, this factor did not have an influence for condom use promoting interventions for recipients under twenty-one, who are similar to those captured in the school-delivered programs we reviewed in this chapter. Gender and ethnic similarity also failed to moderate efficacy in condom use promoting interventions for people under twenty-one, but age and risk group similarity did. Specifically, having a facilitator similar in age and from the same risk group (e.g., gay for a gay audience) improved intervention outcomes.

Population Characteristics

Population characteristics including risk group and age have been frequently studied in relation to intervention efficacy. With respect to risk, drug prevention interventions should target at-risk audiences, but meta-analyses have revealed that the impact of such efforts is not always high. To begin, although Soole and colleagues (2008) did not report overall comparisons between high and low risk samples, their synthesis suggests that generic skills interventions (knowledge-based interventions with promotion of generic skills like communication and decision making), social influence interventions (addressing peer influence and norms), and system-wide interventions (multi-component programs incorporating family, community, or media aspects) had smaller effects for at risk (vs. not at risk) groups. However, noting that substance use, among peers and poor academic performance are among the best predictors of drug use initiation, Griffin and colleagues (2003) identified at risk individuals by self-report measures of

these variables and found that a life skills training program (emphasizing resistance techniques, norms against drug use, and social skills) positively impacted at risk youth. In their meta-analysis of problem behavior prevention, Wilson and colleagues (2001) found no relation between risk and intervention efficacy, though interventions with high-risk populations were more effective for other problem behaviors—delinquency and school nonattendance. A later meta-analysis exclusively on substance abuse by the same team (Gottfredson & Wilson, 2003) also indicated similar levels of efficacy for at risk (effect size: .05) and general (effect size: .07) populations. Finally, although outside our review of *prevention* efforts, research tends to indicate that universal interventions tend to have null or negative effects on populations already using drugs (see Gottfredson & Wilson, 2003), and the standard messages advocating absolutely no use may be problematic in this case (Brown & Kreft, 1998; see also Albarracín, Kumkale, & Cohen, 2002).

Another major population characteristic addressed by the meta-analytic evidence on school-based interventions is age. In recent years, about 20 percent of American youth have tried an illicit drug by eighth grade and around 50 percent have done so by twelfth grade (Johnston et al. 2009). The evidence concerning intervention efficacy for ages with the highest prevalence of drug use, however, is ambiguous. On the one hand, in Tobler and colleagues' (2000) analysis of 207 programs, although the largest proportion of interventions started in junior high school, the largest effect size was obtained for those programs that began in high school (0.18) rather than junior high (0.11) or elementary (0.07) school. On the other hand, a remaining group of syntheses has reported better effects for earlier intervention delivery as well as null effects of age. Specifically, Rooney and Murray's (1998) meta-analysis of antismoking interventions ranged from grades six to twelve and suggested that the best outcomes occur when interventions start in early junior high school, especially for interventions with peer involvement. Further muddying the waters, Gottfredson and Wilson (2003) found no statistically significant effect of school grade in an analysis that specifically concerned developmental aspects of intervention efficacy. Thus, the meta-analytic evidence does not clearly indicate a most effective period for intervention, although interventions beginning in late elementary and continuing through high school have some efficacy. Few interventions begin earlier, largely due to concerns about the ability of younger people to understand the content, but an early start may ensure longer term effects when use is otherwise prevalent.

Discussion

Though taking the bird's eye view of the data in aggregate has its advantages, the present approach sacrifices some descriptive utility regarding the format and content of public communication drug prevention interventions. As others have noted (e.g., Tobler & Stratton, 1997), a tremendous amount of ambiguity surrounds the analysis of the efficacy of program components for various reasons: insufficient

reporting of details, routine use of multicomponent approaches, and the lack of consistent terminology. It is, of course, important to look more closely—other sources are available for critical analysis of the specific characteristics of mass media (e.g., Atkin, 2002; Hornik, 2002; Palmgreen & Donohue, 2006) and school-based (e.g., Battjes, 1985; Cuijpers, 2002; Gottfredson & Gottfredson, 2002; McBride, 2003) interventions. Regardless, the present approach suffices to assess the existing evidence regarding the aggregate efficacy of public antidrug interventions.

In sum, the meta-analytic evidence on the efficacy public drug prevention interventions indicates that their average effects on drug use are very small. In the case of mass media interventions, apparently successful individual programs notwithstanding, the current status of the evidence is disappointing. It is difficult to claim with certainty that mass media campaigns have on average had any positive effect at all. For school-based interventions, it is easier to make a case that their success is proven, but only with the caveat that the average effect is very small. However, many would argue that the practical significance of even a very small effect in this domain is compelling. Regardless, both types of intervention remain common and efforts will continue. With that in mind, we turn to the general question of what might improve matters moving forward.

Health Behavior Theories

There are several important considerations for future research on drug prevention that follow from established health behavior theories. With respect to content, the meta-analyses of drug-use prevention interventions have used a limited set of categories to classify contents in ways that map onto recommendations derived from current theories of behavior change. Several theoretical models of the motivational and cognitive antecedents of health behaviors have been advocated in diverse areas, including drug prevention.

Reasoned Action Approach

For example, the theory of reasoned action (Fishbein & Ajzen, 1975) and the theory of planned behavior (Ajzen & Madden, 1986; for a meta-analysis, see Albarracín, Johnson, Fishbein & Muellerleile, 2001) state that health behaviors are contingent on the perceived desirability of the behavior (i.e., positive attitudes and expectancies about the behavior) and the normative pressure to engage in the behavior (i.e., social norms). The theory of planned behavior also incorporates perceptions that the behavior is easy and up to the individual (i.e., perceived behavioral control). Social-cognitive theory (Bandura, 1989, 1991) states that people's health behaviors depend on feeling confidence in their sense of agency and control over those behaviors, because self-efficacy is central to implementing behavior. Furthermore, social-cognitive theory and the information-motivation-behavioral-skills model (Fisher & Fisher, 1992) both assume that people are more likely to perform a behavior once they acquire relevant knowledge and behavioral

skills. Other models have concentrated on the role of the perceived threat posed by a health problem and advanced conflicting predictions. For example, the health-belief model (Rosenstock, Strecher, & Becker, 1994) and the protection-motivation theory (Floyd, Prentice-Dunn, & Rogers, 2000) hypothesize that people are motivated to initiate healthy behaviors when they fear the severity of the disease and believe that they are personally susceptible to it (but see Gerrard, Gibbons, & Bushman's [1996] null meta-analytic findings).

As Fishbein and his colleagues (Albarracín, Fishbein, & Middlestadt, 1998; Fishbein, 1995; Fishbein & Guinan, 1996) observed, all of these theoretical models suggest a number of different intervention strategies that can be expected to change behavior. Each strategy dictates the particular types of content of an intervention and the ways in which the intervention affects behavior. Interventions that attempt to modify attitudes and norms usually consist of assertions that the behavior being advocated has personally or socially beneficial consequences (see Ajzen & Fishbein, 1980). For example, large-scale projects launched by the CDC during the 1990s were designed to induce recipients' belief in the favorable outcomes of using condoms, including health promotion and increased psychological satisfaction (CDC, 1997; Kamb et al. 1998). Likewise, in the domain of drug use prevention (Fishbein et al. 2002) the beliefs underpinning attitudes and perceptions of norms have been targeted in theory-guided interventions.

Information-Motivation-Behavioral Skills Model

The information-motivation-behavioral skills model posits that information, motivation, and behavioral skills predict actual behaviors. Thus, the model can inspire three types of interventions to reduce drug use, each of which targets information, motivation or behavioral skills and can be used in combination with the other two (see Fisher & Fisher, 2000). An informational communication typically conveys structured data on the nature of drug use and methods of prevention. Motivational interventions attempt to induce favorable attitudes as well as social norms in support of the behavior and perceived vulnerability to drug use, typically combining the strategies we discussed in the context of the theories of reasoned action and planned behavior (e.g., Fisher, Williams, Fisher, & Malloy, 1999). To the best of our knowledge, this model has never been utilized for interventions to decrease drug initiation, but has been successful in changing related behaviors such as adherence to medication regimes and active use of substances in situations that increase HIV risk (Fisher et al. 2002).

According to the information-motivation-behavioral skills model, however, disease prevention programs are generally not successful unless they manage to increase behavioral skills as well. Thus, interventions based on this model often contain behavioral scripts about strategies that yield successful performance of the behavior. For example, a persuasive message may not only recommend not smoking or using illicit drugs and mention its advantages, but also describe how success at these goals depends on prerequisite actions, such as developing self-confidence

compete with or supplement the potent influence of peers, but also are themselves objects of recipients' perceptions that are shaped by peer reactions both, as they are being delivered and subsequently. In an interesting experimental demonstration of such dynamics, twelfth grade participants viewed anti-marijuana ads and then either discussed the ads in a chat room with other participants or did not participate in any discussion (David, Capella, & Fishbein, 2006). Discussing the ads with peers led to more positive attitudes toward marijuana and a greater perception of peer pressure to use it. It would be valuable to know more about what prompts individuals to discuss interventions with others and when positive or negative evaluations are communicated. Though interventions routinely examine outcomes related to the evaluation of the targeted substances, it is much rarer to assess attitudes towards the intervention.

Further regarding behaviors by peers, it is difficult to overstate the challenge for interventions of competing with peer influence. For example, in a study of 1,955 fourteen- to seventeen-year-olds, Huang, Hollis, Polen, Lapidus, and Austin (2005) studied a number of factors that may correlate with the initiation of smoking. This study showed that of all factors (demographics, body weight, exercising, smoking in the household, schooling, depression, and smoking among friends), smoking among friends was the single most important predictor of smoking initiation. Estimated susceptibility in the sample was 11 percent when no friend smoked, 28 percent when few to less than a half of the friends smoked, and 44 percent when half or more of the friends smoked. At the very least then, having friends who smoke must provide opportunities to smoke.

The actual reasons why smoking by others influences one's smoking are likely complex. However, Aloise-Young, Graham, and Hansen (1994) identified situations in which smoking is used to gain friends. The researchers obtained data from 342 seventh graders who were nonsmokers at the time. These participants were classified as being members or outsiders of a group from which data from a member was also available. This other person reported on smoking in the group and friendship. Thus, the researchers could establish whether a target person was a member of a group with/without smoking or an outsider of a group with/without smoking. Change in smoking status could thus elucidate whether smoking was more likely to enter a given group than to remain in a given group. In these analyses, there was a positive association between the participant's and the friend's smoking status when the participant was an outsider concerned with entering the group. However, neither mass media nor school-delivered interventions have successfully tackled the peer influence problem.

Message Source and Message Recipient

The social relation between the message source and the recipients is also likely to be important. Most interventions are delivered by an authority figure of some kind. Mass media interventions are typically delivered by government agencies

and these are often explicitly identified as the source. School-based interventions are frequently delivered by teachers or police officers, as in the DARE program. As such, there is potential for recipients to feel the intervention is a threat to personal autonomy. A common response to feeling pressured to change one's behavior is to experience "psychological reactance" (Brehm, 1966), an aversive state that can be alleviated by asserting one's autonomy, often in contradiction to the perceived threat. Young people, who often desire greater levels of autonomy than they have, may be prone to psychological reactance (e.g., Woller, Buboltz, & Loveland, 2007). Unsurprisingly, evidence does indicate that reactance can undermine intervention efforts for young people, including drug prevention interventions (Bensley & Wu, 1991; Liu et al. 2014; Grandpre et al. 2003); therefore, practitioners should aspire to avoid provoking reactance and to reassure recipients of their autonomy. Blatant, heavy-handed attempts at social influence are especially likely to induce reactance. It is quite possible that the apparent superiority of peer-led interventions and interactive interventions is related to the likelihood of inducing psychological reactance.

Group Identities

Another facet of the social context of interventions concerns the group identities of the recipients. As noted, it is difficult to overstate the influence of peers in determining whether young people do or do not initiate drug use, particularly for ingroup peers when an individual is highly identified with the group. Although the importance of peer norms in initiation has long been recognized, more recent research has clarified that general impressions of normativity are less important than perceptions of the norms of major reference groups to which individuals are highly identified (Johnston & White, 2003; Neighbors et al. 2010). Drug use can also become a central aspect of group membership, contributing to the development of more seriously problematic use (e.g., Livingstone, Young, & Manstead, 2011). Even though it is difficult to incorporate peer-group level identities in intervention efforts, for individuals highly identified with their groups, the school (quite common at the university level) may be a highly relevant group identity influencing drug use behaviors. It appears that the beer industry has perceived value in taking advantage of consumers' identification with universities by releasing university-themed "fan cans" in several college markets (Loersch & Bartholow, 2011).

Strict Abstinence Messaging: Is it Always Ideal?

For obvious reasons, antidrug campaigns typically have strict abstinence messages, and it certainly seems inappropriate to have any other sort of content for those who have never tried the substance in question. But, for those who have already tried a drug or will later try it, might the absolutist arguments be undermining,

particularly if initiation is accompanied by no obvious and immediate negative consequences? Some interventions' limited efficacy may have to do less with reactance and more with reasoning processes when message recipients compare the message they received with their prior or subsequent behavior and found their behavior in contradiction to the message. Research conducted by Albarracín, Cohen, and Kumkale (2003) supports the prediction that inducing an unrealistic expectation that people later disconfirm can increase resistance to persuasion. That is, recipients of the message reason that if they have already engaged in the behavior discouraged by the message they may have a strong disposition towards the behavior. In this research, a female experimenter wearing a lab coat informed participants that the researchers were conducting research on an alcohol substitute product to be marketed to people of all ages. She then explained that they would see materials from a consumer education program designed to inform people about products containing the alcohol substitute. She indicated that parts of the program were more informational in content and tone, whereas other parts more closely resembled advertising messages. All participants then received one of two versions (i.e., abstinence vs. moderation) of a booklet that contained four persuasive messages that recommended either abstinence from or moderation in the use of simulated alcohol. For example, one of the abstinence messages presented a picture of a dog and read, "When your dog is looking sexy ... you know you've had too much to drink. There is a new product coming your way. Even though it is not legally alcohol, it has the same effects. No one needs to drink. Say no!" The moderation version was identical except that the recommendation was "Play it smart. Set limits!"

The researchers analyzed drinking intentions as a function of message type (abstinence vs. moderation) and trial behavior (trial vs. message only). As predicted, participants who did not try the product reported stronger intentions to drink when they received the moderation message than when they received the abstinence message. In contrast, when participants tried the product after receiving the message, recipients of the abstinence message had stronger drinking intentions than recipients of the moderation message. Importantly, the similarity of the effects across actual (Experiment 1) and observed (Experiment 2) experiences supported the interpretation that the effects are driven by self-perception types of inferences.

As the research by Albarracín, Kumkale, and Cohen (2003) illustrates, communications often induce resistance to their intended message. However, some characteristics of persuasive communications can trigger processes that alter the course of expectancy disconfirmation. Specifically, if the communication manages to induce an external attribution of the expectancy disconfirmation, people should be unlikely to change their attitudes to accommodate the expectancy disconfirmation. If that is the case, people who engage in a behavior that contradicts their earlier self-predictions based on a persuasive communication may conclude that the message and the source were weak. This external attribution should prevent attitude change.

A similar process may be elicited when people make external attributions that social influence (an external source) caused their behavior or that they could not control their behavior. For example, a persuasive communication that recommends abstinence may assert that individuals often engage in the pertinent behavior because there are strong social norms to do so. In those situations, the communication may increase the salience of a potential "excuse" that message recipients can use if they engage in the discouraged behavior. In this way, a strong social norm in favor of the behavior may reduce undesirable attitude change.

A communication that attempts to convince recipients that they can exert personal control over a target behavior may also produce ironic attitude change. Presumably, when a message advocates actions that recipients fail to follow, assuming that one was in control of the behavior should facilitate inferences that one's attitudes caused the behavior. In contrast, a more cautious message conveying that people do not always control the target behavior may allow audiences to attribute their expectancy-disconfirming behavior to factors outside of their control. In those situations, ironic attitude change may decrease. For example, an abstinence message that states that people sometimes drink for reasons outside of their control may be more effective than the mere presentation of the abstinence recommendation.

Scientific Considerations for Improving Interventions

The research we have reviewed suggests that no "silver bullet" in drug prevention interventions that works well and uniformly has been discovered. Most likely, one does not exist. What works for one population or one drug may not work for another, and many programs may be doomed to failure regardless of the population. For this reason, one of the easiest recommendations to make is that practitioners pretest their interventions on appropriate samples of their target population before implementing them widely. The obvious advantage here is acquiring evidence regarding the intervention's accuracy in advance. Another reason is that smaller scale pretests also afford an opportunity to introduce experimental manipulations or more intensive procedures that would be infeasible given mass implementation. For example, it may not be feasible to utilize implicit attitude measures (Fazio & Olson, 2003) as an outcome measure for many interventions, but because they are insensitive to social desirability concerns, among other reasons, they could be very valuable for hypothesis testing during a pretest. Implicit attitude measures are also especially predictive of impulsive behaviors (Friese, Hofmann, & Wänke, 2008) and behavior when cognitive resources are compromised including by intoxication (Hofmann & Friese, 2008), suggesting that they may have particular utility in the prediction of drug abuse. A second consideration is needed for more isolation of critical features. For obvious reasons, many interventions take a "kitchen sink," multicomponent approach to prevention. No opportunity to make a difference is passed up. However, this renders it difficult to advance theory because it is unclear what features are

effective and whether any are undermining. A greater number of experiments need not just a treatment and control, but multiple treatment conditions to better answer the question of "why it works" in addition to "whether it works."

Conclusion

In this chapter, we have reviewed the meta-analytic evidence regarding the efficacy of drug prevention interventions, allowing the integration of the large body of empirical studies on the topic. In aggregate, the evidence suggests that reductions in drug use initiation behaviors following interventions are typically very small, but are greater than zero and have practical significance given the importance of this outcome. However, this case is more easily made for school-based interventions than mass media interventions. Unfortunately, there are a great many questions that remain unanswered. There is no overwhelming data to determine interventions targeting one substance or another are especially effective. Generally, evidence regarding audience characteristics was mixed, with little consensus regarding for whom interventions are most productive. However, we do want to emphasize one rather clear finding from our review. Evidence suggests that variation in efficacy is partially attributable to the content and format of interventions such that didactic, knowledge-based interventions in which an authority figure communicates the negative consequences of substance use typically have lesser success. These are, of course, the predominant interventions. Somewhat more success appears to come from interactive interventions in which audiences play a more active role, and from peer-led interventions. There are two reasons why this is possibly the case. First, didactic, authoritarian interventions may evoke threats to autonomy and thus reactance. Secondly, the traditional intervention fails to acknowledge the fundamentally *social* psychological nature of the initiation of drug use. Interventions aimed solely at intraindividual factors neglect to address the primary determinant of initiation, peer interactions, in anything but the most indirect manner. It is critical also to understand drug initiation and non-initiation in their social contexts. A greater integration of psychological theory relating to social identity, group relations, and networks might further the refinement of interventions. Many practitioners have hoped that some message, carefully crafted, can overwhelm the social factors that underpin initiation. It has not yet been discovered and probably never will be. But, there is some encouragement to be found in the changing face of intervention in which an audience member is not a mere target but a participant and peer.

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