Substance Use Among High School Athletes: Implications for Prevention Interventions

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SUMMARY. During the past two decades, prevention specialists have responded to concerns about youthful substance use by developing a variety of programs. The most effective of these programs have been based upon our understanding of the risk and protective factors involved. While student-athletes generally share the same level of risk as other high school students, as a group, they may have other characteristics that can be considered. In addition, the special socializing experience of participating in athletics may present special opportunities for prevention. We suggest that it is prudent to build upon important lessons in designing programs for student athletes and we provide, as a starting point, an overview of twelve key processes with demonstrated impact.

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BACKGROUND

Exposure to alcohol and popular drugs of abuse such as tobacco, marijuana, cocaine and club drugs among adolescents and young adults in high school, college and the work force is a common, though disturbing, phenomenon. Such exposure is often viewed as "normative" (both statistically and developmentally) even though the contact carries with it potentially serious and even life-threatening consequences. The most prevalent experience among adolescents and emerging adults is with beverage alcohol though exposure rates to street drugs such as marijuana and ecstasy remain significant (Johnston & O'Malley, 2001). Heavy drinking and experimenting with other drug use have been viewed as "rites of passage" for many students not only in college (Vicary & Karshin, 2002) but also those transiting the high school years (Weschler et al., 2001). Alcohol use patterns, including those indicative of serious problems, which emerge in early adolescence (i.e., the high school years) may continue for some youths through early adulthood (Baer et al., 2001; Weingardt et al., 1998) during their college years or during their transition from high school to the workforce (Berkowitz & Perkins, 1986; Baer, Kivlahan, & Marlatt, 1995). Emerging evidence indicates that use of other substances follows a similar course. Many individuals who engage in what can be considered "dangerous" or excessive use during these developmental periods may abandon such practices as they enter adulthood. However, for some, these problematic behaviors will endure a lifetime (O'Neill et al., 2001). Hence, given the universality of this phenomenon, coping with potential situations where exposure occurs may be considered an important developmental challenge for youths from a wide variety of social, economic and ethnic backgrounds.

A large number of putative "risk and protective" factors have been associated with various forms of substance use behavior (Hawkins et al., 1992; Petraitis et al., 1995; Pandina, 1998). These factors are drawn from a broad range of biological, psychological and socio-environmental factors and conditions. To date, no set of factors has been demonstrated to account satisfactorily for the wide range of use behaviors and outcomes observed among the general population or within specific sub-populations. This observation is valid even when examining a narrow range of use behaviors or outcomes (e.g., use initiation; problematic use; abstinence) or when examining a narrow segment of the

youthful population who might be considered at either heightened risk (e.g., children of alcoholics) or who may be purportedly at reduced risk. During the past two decades, prevention scientists have attempted to respond to concerns about substance use behaviors of American youth by developing and testing a variety of programs designed to block use initiation and reduce or eliminate use escalation in those who have experimented with substances. The most effective of these programs, considered to be evidenced based and empirically tested, have been based upon our understanding of the etiological risk and protective factors and putative major mediating factors. While significant advances have been made in prevention efforts, substance use remains a serious threat to biological, psychological and social growth and the potential of many young people.

The focus of this article is to examine the risk status of a specific sub-set of youths who, during their teen years in high school, choose to engage in organized sponsored athletic activities. With approximately 6.9 million high school students participating in school-sponsored athletics (National Federation of High School Associations, 2004), adolescence represents a window of opportunity for prevention for this interesting aggregation of adolescents. Here, we focus on several core questions. Do student-athletes differ from their high school age-related peers in their use patterns? Are there specific risk and protective factor profiles and mediating factors that may affect use patterns and status of student-athletes differentially? What are the implications of these questions for the design and implementation of potentially effective prevention intervention strategies specifically targeting student-athletes?

DRUG USE AMONG ADOLESCENTS

Recent results of the Monitoring the Future Survey (Johnston et al., 2001), a nationwide assessment of use behavior of a representative sample of students from over 120 high schools across the United States, indicate that, among 8th graders, 22% had used alcohol in the past month. This percentage increased to 41% among 10th graders and to 50% among high school seniors. The proportions for monthly marijuana use were reported as 9% in 8th grade, 19% in 10th grade, and 21% in 12th grade. The proportions for the use of any other illicit drug were reported as 5%, 8% and 10%, for 8th, 10th, and 12th graders, respectively. Recent statewide surveys conducted by SAMHSA (e.g., Wright & Davis, 2001) essentially have replicated these results. By and

large, both the Monitoring the Future Survey and the SAMHSA investigators found significant increases in youthful illicit drug use from 1992-1996. A third population based study, the National Household Survey, found that drug use remained relatively steady between 1998-1999, except for the use of MDMA (ecstasy) which increased among those in the 10th-12th grades. Interestingly, recent studies indicate use of steroids (and related supplements) was reported by as many as 5% to 10% of high school students. The extent of use of these types of substances by younger adolescents appears to be a rather recent phenomenon (see also, Buckley et al., 1988; Pandina & Hendrin, 1999).

Substance use has resulted in serious consequences for youths and major problems for secondary schools throughout the United States. In addition to documenting the extent of drug use among adolescents, the SAMHSA survey also found that students reported a variety of problems associated with the use of drugs, such as recovering from the effects of the drug, the propensity to use in larger amounts, development of tolerance to the drug, impaired activity level due to the effects of drug use, emotional or psychological problems, health problems, and efforts to try to cut down the use of drugs. These consequences have all been cited as indicators of abusive consumption. In spite of the fluctuations in use patterns during the past decade, results of these national and state-wide surveys, along with those from more local and regional derived samples, lead to the conclusion that use initiation, escalation and serious consequences related to use behaviors represent a continuing threat to adolescent development.

This brief overview supports several conclusions. First, substance use behaviors appear to escalate during mid-adolescence with a rather dramatic increase in incidence and prevalence during the period of transition to high school. Second, substance use results in serious negative consequences for both youths and schools. Third, use initiation, escalation and consequences related to use behaviors represent a continuing threat to adolescent development. Finally, schools continue to face the serious challenge of coping with substance use and its consequences among students from a wide range of social, economic, and ethnic backgrounds.

ARE ATHLETES DIFFERENT?

Early research (e.g., Straus, 1953) speculated that athletes would be more likely to maintain physical fitness and would thus be less likely to

drink than non-athletes. These early investigations, of course, did not and could not anticipate the dramatic changes in "recreational" (though far from benign) drug use that began in the late 1960s and escalated in the 1970s that swept across the American scene. Hence, more recent research efforts paint a significantly different, though not an altogether consistent or definitive, picture of alcohol and drug use among athletes. Given the significant social changes that have occurred since these earlier observations and the evolution of athletics (including the professional, collegiate, elite and high school levels), it is not surprising that the picture has become more complex. It should also be noted that, in spite of the growing concern and extensive public attention about alcohol and drug abuse and use of performance enhancing substances among professional, elite and, more recently, amateur athletes, the scientific literature on this important topic is sparse and provides at best sketchy speculative profiles of use among serious athletes at all levels.

The most frequently studied athletes are those attending colleges and universities and the focus has often been upon alcohol use or performance enhancing substances. Hence, it may be instructive to review some of these findings, especially as many high school athletes go on to some level of competition at higher levels and because, arguably, collegiate athletics (in all of its aspects) may serve to set patterns for those who aspire to continue beyond high school. Overall, the literature would suggest that student athletes drink more frequently and in greater quantities than non-athletes (Hildebrand et al., 2001; Leichliter et al., 1998; Nattiv & Puffer, 1991; Selby et al., 1990; Wechsler et al., 1997).

For example, Wechsler et al. (2001) found that college students who were current athletes and those who were former athletes (in high school) drank alcohol more frequently and in greater quantities, had earlier onset of alcohol use, and engaged in alcohol-related risk behaviors (e.g., engaged in sexual intercourse, driven a car) more frequently than students who had never been athletes. There were few significant differences between former and current athletes in drinking patterns suggesting that these patterns are established in high school. On the other hand, the college athletes engaged in significantly more alcohol-related risk behaviors than the former athletes suggesting that the "best" athletes may see themselves as most invisible or may be the highest sensation seekers/risk takers. Nattiv and Puffer (1991) also found that college athletes engage in risky behaviors more often than non-athletes.

Further, athletes compared to non-athletes have been found to be more likely to experience negative consequences of alcohol and drug use (Presley et al., 2002) suggesting greater levels of use or, alterna-

tively, greater vulnerability to use resulting, perhaps, from greater performance demands and stress placed upon student-athletes. Thombs (2000), however, argues that a stress-coping perspective has not been supported for college athletes. Rather it is more likely that the same forces that shape drinking among other students, such as drinking norms and a permissive campus culture, influence drinking among athletes.

Wechsler et al. (1997) found that similar variables predict heavier drinking for athletes than for non-athletes. Furthermore, the fact that athletes are able to modify their drinking during their competitive season suggests that they are adaptive in their behavior and that proactive policies and programs can have a positive effect on their drinking behavior (Thombs, 2000). Wechsler et al. (1997) argue the fact that college athletes are less likely to smoke cigarettes than their peers suggests that they may be amenable to prevention approaches that demonstrate the potential negative effects of other drugs on athletic performance.

The results of the few empirical studies drawing from high school age samples suggest a picture similar to that speculative picture emerging from studies of college athletes. For example, Aaron et al. (1995) conducted a study on alcohol use among athletes in grades 7-9 and found that males in competitive athletics were more likely to report alcohol use than those who did not play sports. Likewise, Carr and colleagues (1990) studied students in a large suburban high school and noted that 50% of male athletes reported using alcohol more than once a month compared to 41% of male non-athletes.

Naylor et al. (2001) found that athletes were less likely than classmates to use cocaine and psychedelics, but more likely to use creatine. Melnick et al. (2001), in a study of more than 16,000 high school students, found that athletes were less likely to smoke tobacco, but more likely to chew tobacco than their non-athlete counterparts. While regional (Shields, 1995) and gender (Ewing, 1998) differences can be inferred, researchers have found that there are commonalities associated with substance use among youth, regardless of athletic participation, including motivations for use (Green, 1995).

What can we conclude about the high school athletes' alcohol and drug use risk from the sparse data available? From a strictly scientific perspective, it would be premature to draw any definitive conclusions about the heightened or reduced risk that might be engendered by a youth's status as a high school student-athlete. The most reasonable position (besides arguing for additional studies on this important topic) is to work from the viewpoint that student-athletes are a reasonably rep-

resentative sample drawn from high school students in general. As such they also share the same level of risk as other high school students, which, as we have seen, are significant. What may also be worth considering, especially within the context of potential prevention programming, is the fact that, as a group, they may have characteristics that can and should be considered in the design of such programs. In addition, the special socializing experience of participating in high school athletics may present special opportunities for prevention.

Next, we turn to several factors that define, in part, the high school athletic experience that are important to consider when thinking about prevention programming for this special group. In this regard, we will not focus on the physical strains and stresses of competition but rather on the psychological and social challenges accompanying athletics and what these suggest about prevention activities.

RISK AND PROTECTIVE FACTORS: IMPORTANCE FOR PREVENTION PROGRAMMING

A significant and extensive literature has evolved during the past quarter century that characterizes and links a multitude of risk and protective factors to trajectories of use and the development of problematic outcomes (for reviews see Hawkins et al., 1992; Petraitis et al., 1995; Pandina, 1998). Many findings from the risk and protective factor literature have had a profound impact upon prevention programming (Ammerman et al., 1999; Scheier, 2001). In addition, converging lines of evidence have indicated that the development of psychological self-regulation spans the period from birth to early adulthood (Stuss, 1992), and that abilities associated with self-regulation are integral components of the risk (or protection) for substance use in adolescence (Mezzich et al., 1997). Having an intervention that is theoretically and empirically tied to a set of known risk and protective factors increases the likelihood of its efficacy (Brown & Liao, 1999). Most importantly, it is considered axiomatic that effective prevention programming must be anchored in an understanding of risk and protective factors and the developmental trajectories of problem behavior including drug abuse (Coie et al., 1993; Mrazek & Haggerty, 1994; Labouvie et al., 1991; Pandina, 1998; Tobler, 1992; Tobler & Stratton, 1997; Sloboda & David, 1997).

Differences in individual responses to developmental transitions or tasks result from the balance of the risk and protective factors that these

adolescents have at their disposal. Hence, a key focus in prevention programming has been the identification of risk (and protective) factors within specific developmental periods that appear to be linked to the transition (or absence of transition) to problematic outcomes and the design of intervention programs targeted at reducing risk profiles and enhancing protective factors. Protective factors can help to safeguard youth from substance use. Many youth growing up in presumably high-risk families and environments emerge relatively problem free. Protective factors balance and buffer risk factors (Hawkins et al., 1992). Protective factors decrease the likelihood of an adolescent's engaging in problem behaviors by providing personal and/or social controls (Nettles et al., 2000). Risk-focused programming, which has been the mainstay of contemporary prevention efforts, has recently come under re-appraisal. While focusing only on risk factors, program elements concentrate on the negative elements of an individual's life, rather than the strengths. Building on and enhancing protective factors within a healthy lifestyle model is hypothesized to be a more promising approach (Brown, 2001). The program of research proposed in this application embraces this need to focus on health promotion and protective factors as a means of drug use prevention.

A thorough review of these factors (by one count over 100 putative factors that have received empirical support!) and their dynamic relationship to various substance use behaviors and outcomes is beyond the scope of this article. However, several core factors and domains have been consistently linked to increased risk for, or conversely, to protection from substance use and abuse that may be especially salient for consideration in prevention program development. These core factors include: peer group dynamics and peer norms (real and perceived) related to substance use; quality and quantity of parental monitoring and supervision (and that of "other significant adults" such as coaches or teacher-mentors); nature and strength of attachment to school and other pro-social environments and activities (including opportunities for engagement); propensity toward sensation seeking and risk taking; level of competence in a variety of life skills, including conflict negotiation as well as anger (and other strong emotional states), stress and time management.

Obviously, these factors would be relevant for athletes and non-athletes alike. There may be other factors (or variants of the core factors) that are likely to be especially salient for student athletes above and beyond those relevant for the typical teenager because of the special circumstances of this group and because of potential "stressors" not

experienced in the same manner by non-athlete peers (Pinkerton, Hinz, & Barrow, 1989). It is important to note that these factors should be considered as speculative in that strong empirical investigation into the relationships between these factors and their unique contribution to substance abuse and student-athletes is lacking. Nonetheless, consideration of these factors makes theoretical sense and fits with the experience of many professionals who have worked with athletes. These factors include: identity development and expression, social isolation, athletic injury, and performance stress. We will discuss briefly each of these factors.

Identity formation. The early work of Nelson (1983) suggests the potential impact of identity and role diffusion on the development of the adolescent athlete. Athletic ability correlates with strong peer acceptance and athletes are often among the most visible and admired people at school, especially in school environments that place high value on athletic success. Potential problems may arise when an athlete defines their capabilities (and their personal sense of self) in terms of athletic skills and neglects the development of other vocational and social identities. Athletes who demonstrate such overidentification with athletic talent may experience identity confusion in later adolescence.

Social isolation. Many athletes may become functionally isolated from their non-athlete peers. Long hours of practice can be compounded by travel to athletic events (Pinkerton et al., 1989). Athletes who are also serious students divide time between sports and pursuit of academics, thereby limiting opportunity to socialize with non-athlete peers. Additionally, athletes' tendency to aggregate with other student-athletes outside of practice may perpetuate their emphasis on their athletic identity in competition with academic identity. This strong emphasis on the athlete role may lead to maladaptive thinking and behavior (Andersen, 1996).

Athletic injury. In many instances, high school athletes participate in sports with the aspiration of earning a college-athletic scholarship. For students who sustain career-ending injuries, the sudden loss of dreams and identity can leave them susceptible to severe adjustment problems and depression (Brewer, 1993; Kleiber & Brock, 1992). As a result, the transition out of sports can be stressful.

Coping with performance stress. A major reason many adolescents use drugs is to cope with negative affect (that is, strong often chronically experienced negative emotions). Athletes encounter a complicated struggle between balancing realistic and idealistic goals and meeting the real and perceived performance goals relative to athletic

prowess and performance. Athletes must satisfy their own demands as well as attend to objectives set forth by parents, peers, coaches, and teachers. Further, their performance is typically "public" and subject to scrutiny, praise and criticism some of which is likely modeled after that given to professional athletes. Green and Burke (1995) found that high school athletes that identified feeling angry also reported increased alcohol consumption as compared to their non-athlete peers. Further, athletes who suffer from low self-esteem are more likely to engage in substance use than athletes with high self-esteem (McGuire, 1990; Roberts-Wilbur, 1987). Presumably esteem may be a reflection of performance competence.

SCHOOL BASED PREVENTION PROGRAMMING

Before considering the possible special needs of and models for programming for student-athletes, it is instructive to review briefly the status of prevention programs for their age related peers. Currently, prevention programs reach less than half of the nation's school children and many of the programs are focused on elementary or middle school students (Durlak, 1995). Overviews of the multiple and varied school based programs can be found in publications distributed by Drug Strategies (1996), the Center for Substance Abuse Prevention (1999) and others. Classifying prevention programs as either universal, selective or indicated (in some circles, referred to as "targeted") is a recent adoption by the National Institute on Drug Abuse. These school based prevention programs vary widely in terms of type, age of the student at implementation, and style of material delivery.

Most school based prevention programs have typically been universal, very structured, curriculum driven, and teacher to student communicated (Ennett et al., 2003; Shin, 2001). In general, programs have exhibited small effect sizes (Foxcroft et al., 1997; Gorman, 1998; Moskowitz, 1993; Tobler, 1996). Few schools offer interventions that involve changing the school environment or integrating prevention efforts into existing school based activities. A handful of studies have compared the effectiveness of universal prevention activities for groups that differed according to their level of use at baseline (e.g., Bell et al., 1993; Ellickson & Bell, 1990) and found that universal programs designed to prevent initiation may have no effect for the most at-risk population. Indeed, many students may have initiated use behaviors prior to their entering high school. Therefore, while selective and indicated pro-

grams may be costly, they may prove to be the most cost effective because they reach students who could potentially benefit the most from the intervention. Gottfredson and Wilson (2003) argue that an understanding of the elements of effective prevention programming for high-risk youth is essential in order to develop and test such programs.

Emerging evidence suggests that comprehensive school based prevention approaches that appear to be effective are due to the synergistic combination of social influence and competence enhancement processes thought to mediate or moderate outcomes (Epstein et al., 2002; Scheier et al., 1997) including norm setting (Kumar et al., 2002), refusal skills, self-management skills, and general social skills. Others have found a positive effect in reducing substance use by combining social competence enhancement with information dissemination (Caplan et al., 1992). However, other investigators have found that the combination of social influence resistance training and promoting norms against use has produced only modest effects in reducing onset and prevalence (Ellickson & Bell, 1990; Hansen et al., 1988).

Table 1, which is adapted from Hansen (1992), describes the mediating processes that successful programs have incorporated. These processes include those needed to enhance a sense of school attachment and a kinship to other prosocial peers and provide skills necessary to make informed decisions, resist negative influences, set realistic goals, manage anger and stress and develop a belief system consistent with an achievement orientation.

Tobler and Stratton (1997) performed a meta-analysis of 120 school based prevention programs and found that interactive programs reported better outcomes than non-interactive programs. This meta analysis also demonstrated support for a youth involvement approach, which seeks to promote protective mediators such as self-empowerment, leadership, planning, decision-making, opportunities for success, and team building skills. Wilson et al. (2001) conducted a meta-analysis of 165 school based prevention practices. Beyond the general agreement that "something" works, there is much uncertainty about the specific magnitude of the effects, as well as the specific components of the program and specific segments of the population with which prevention works. Generally speaking, Wilson and colleagues found that instructional techniques that do not use cognitive behavioral or behavioral instructional strategies such as mentoring, tutoring, work study programs and recreational programs are not effective. Self-control or social competency promotion instruction using cognitive behavioral and behavioral instructional methods, and non-instructional programs also using these

TABLE 1. Twelve Mediators to Target in Prevention Interventions

Curriculum Content	Target	Mediating Processes
1. Information	Knowledge and beliefs about the consequences of use	Increased belief in the possibility of experiencing harm and decreased belief of positive effects
2. Decision making	Learn procedures about making rational decisions	Application of rational processes for dealing with problem situations
3. Public commitment to prosocial goals	Emphasis on moral reasons for remaining drug free	Development of a personal pledge to abstain
4. Values clarification	Assist individuals in identifying positive or prosocial values	Developing beliefs that values are essential in choice and use is inconsistent with life objectives
5. Goal setting	Skills for attaining goals and an achievement orientation	Develop motivation for achievement orientation and skills for setting life goals
6. Stress management	Strategies to reduce stress and develop alternative coping	Increase self-efficacy for coping and reduction in perceived stress
7. Self-esteem	Developing individual feelings of self-worth	Level of improvement in self-esteem
8. Life skills	Communication and conflict resolution skills	Improve skills for social acceptance and resolving interpersonal problems
9. Resistance skills	Identify and resist pressure to use	Develop skills to refuse use and enhance self-efficacy
10. Norm setting	Correcting erroneous perceptions of use	Lower expectations about prevalence and acceptability of use
11. Prosocial bonding	Emphasis on making a positive school environment	Providing social support and attachment to peer group
12. Alternative programs	Provide activities that are incompatible with use	Reducing the time of exposure to at-risk situations and provide activities that run counter to use

methods, or environmentally focused programs, were all particularly effective.

In addition, the concept of peer leadership in drug abuse prevention has been utilized in prevention programs for more than 25 years (e.g., Capone et al., 1973; Lawler, 1971; Smart et al., 1976). By and large, research on early programs demonstrated that these interventions could

impact upon the level of information known about drug use, as well as facilitate friendships, develop individual responsibility and instill confidence, but raised concerns in as much as significant drug using behavior change could not be detected. Programs showing some promise of success exhibited a common ingredient–student involvement in decision-making.

More recent evidence indicates that the use of peer leaders from the student population to share in the transference of the substance abuse prevention curriculum is more effective than teacher-led conditions (Bell et al., 1993; Botvin et al., 1990; Gottfredson & Wilson, 2003; Midford et al., 2002). From the perspective of communication theory, the effectiveness of the use of peers as influentials is more easily understood. Source credibility is one of the most potent, if not the most potent, means of persuasion (Dahnke & Clastterbuck, 1990). Cuijpers (2002), in a meta-analytic comparison of a dozen peer led and adult led school based drug prevention programs, concluded that effectiveness of these programs is determined by many factors, including content, number of regular and booster sessions and the degree of interaction between students during the program. Such peer-led programs have been found promising in helping to change student social norms (DeJong & Langford, 2002). However, adequate evaluations of these programs are rare and hence, these kinds of programs remain an empirically unproven strategy for reducing drug use. Hence, use of peers and peer leaders, while a promising and potentially powerful approach, requires greater validation.

PROGRAMS FOR STUDENT ATHLETES

By and large, there have been relatively few empirically tested and validated programs that focus upon student athletes at either the high school or collegiate level. Moreover, relatively few programs have been formally evaluated for effects on drug use (Larimer & Cronce, 2002; Grossman & Smiley, 1999) and those that have been evaluated have demonstrated limited efficacy particularly when they employ an educational approach without additional components. For example, a program implemented by the American Medical Association Council on Scientific Affairs (1988) that relied upon use of authoritative educational materials on drug abuse in athletes focusing primarily upon the adverse consequences and limited value of steroid use, was largely un-

successful. The intervention failed to increase student-athletes' belief of negative consequences of anabolic steroids (Ferrante & Etzel, 1991).

Significant effects in drug prevention focusing upon steroid use have been found in limited pilot research sponsored by the National Institute of Drug Abuse that employed an enhanced educational approach. The research included 70 male high school football players who participated in an Adolescents Training and Learning to Avoid Steroids (ATLAS) program. The objective of this intervention was to test a team-based, educational intervention designed to reduce adolescent athletes' intent to use anabolic androgenic steroids (AAS). Despite the relatively small sample, findings associated constructs central to the intervention with: (1) improved body image, (2) developed more realistic norms regarding steroid use, (3) improved understanding of alternatives to steroids, and (4) decreased participants' reliance on supplement powder and pills. A potential strength of the program was that it was delivered by the coach and peer leaders in the high school setting (Goldberg et al., 1996). A parallel program for adolescent females, ATHENA, has been developed but has not yet received a thorough evaluation. (See also the article by Goldberg and Elliot in this issue).

Surveillance for drug use employing a random drug-testing model is currently receiving significant attention and consideration by high school administrators and public officials. In fact, random drug testing has been implemented in a number of school districts for students engaged in extra curricular activities and is being considered for use with general student bodies. It is not surprising that use of drug testing is being considered as a prevention tool with student-athletes inasmuch as both the NCAA and many professional sports employ this methodology. Further, many if not all NCAA Division 1 university athletic programs employ random drug testing at some level in response to concerns about drug use among collegiate athletes and because of potential NCAA sanctions for drug test failures. Hence, high school athletic programs are giving increased consideration to such surveillance programs. These programs are typically viewed as an aid to deter and to detect use. The efficacy of this tool has yet to be thoroughly evaluated. Results to date have been at best equivocal with assessments both providing modest support for efficacy and indicating no effects. (A more comprehensive assessment of surveillance efficacy is currently being completed).

One limited, though interesting, evaluation of the effects of drug testing on adolescent drug use has been reported in the literature. The SATURN (Student Athlete Testing Using Random Notification) project was designed to evaluate whether a nonpunitive, compulsory, ran-

dom, suspicionless drug testing policy deterred drug and alcohol use among high school student athletes in two Oregon schools. Participation was required for all students and was a mandatory prerequisite for athletic participation. Results showed that a policy of random drug testing surveillance significantly reduced self-reports of recent performance enhancing substances and, to a lesser extent, common drugs of abuse but did not produce long-term changes in substance use and associated high-risk behaviors use among adolescent athletes (Goldberg et al., 2003). Further, neither tobacco or alcohol use was altered. This result suggests at least limited efficacy when targeting a specific drug class (steroids) that may be associated with well-documented harm potential to student-athletes. The authors of the investigation caution against over interpretation of results suggesting efficacy of testing as an adequate intervention.

It should be noted that drug surveillance protocols have a limited range of sensitivity for drugs of abuse, that is, detection windows are limited in time. Albeit for some common drugs of abuse such as marijuana, those limits are relatively large (e.g., 14 to 21 days depending upon usage patterns) whereas for other drugs (e.g., cocaine) the detection windows are quite limited. Further, many common protocols (drug screen panels) available from commercial vendors are limited to a small number of drugs (e.g., 8 common drugs of abuse) and may not detect drugs that have become popular with adolescents (e.g., newer club drugs). Finally, drug testing has at best limited utility for detecting alcohol use and abuse, given use patterns of most adolescents.

RECOMMENDATIONS FOR A MODEL PROGRAM

In spite of the concern and attention of school administrators, teachers, coaches and parents regarding alcohol and drug abuse among student-athletes in high school, there appears to be a paucity of empirical research that would help to guide the development of evidenced based targeted prevention programs. What literature is available has led some researchers to conclude that separate programs may not be warranted (e.g., Thombs, 2000; Wechsler et al., 1997). Others have opined that the unique challenges faced by student-athletes (e.g., balancing academic work with competitive demands, maintaining self-motivation and self discipline, dealing with attention and demands from peers, coaches, and parents, coping with physical challenges including injury, and competing for the attention of college recruiters) suggest the need for specially

tailored programs (Danish et al., 1993; Andersen, 1996; Pinkerton et al., 1989; Spence & Gauvin, 1996; NCAA, 2001; Goldberg et al., 2003). In any event, it appears clear that high school aged student athletes are arguably at least at the same, if not greater, level of risk as their age related peers to some forms of use behaviors and related negative outcomes. Further, there are probably a unique set of challenges that face student athletes that may distinguish them that could, and should, be considered if the decision is made to offer separate programming for this interesting target population. Finally, it is likely that school administrators and coaches will continue to experience pressure to offer such special attention and will want to choose programs that have the greatest likelihood of impacting alcohol and drug abuse among these individuals. It is also certain that concerned individuals cannot and will not wait for large scale prevention studies to be available before initiating programs. What guidance, then, can we offer to concerned individuals who choose to move ahead with targeted programs?

Given the state of prevention programming for student-athletes, it is probably prudent to build upon the important lessons obtained from over two decades of research into prevention programming with school attending adolescents. In this regard, we revisit Table 1 and the twelve key processes demonstrated to have an impact in prevention programming as a starting point. Note that for each of the twelve core processes identified in Table 1, generic curriculum and target activities are identified. We would recommend that the generic curriculum be used as a template upon which to tailor specialized programs. Further, we would recommend that the activities and information be mapped upon and modified for what we anticipate to be salient issues for athletes. Below, we give examples of what could be important focal points for modification of the twelve generic curriculum content areas. At the same time, we offer the caveat that empirical support for such accommodations has not been developed and that modifications are suggested that have theoretical meaning and fit with the experience we have had in dealing with young athletes. We also suggest strongly that such modifications could be used as starting points for a practical research agenda.

1. *Information about drugs and use consequences*. It is likely that information about performance enhancing substances (including so-called nutritional supplements) will be more salient for athletes and could act as a catalyst for discussion about use in general. Typical information protocols for high school students do not include such information. Likewise, discussion of tobacco use, es-

pecially for males, should include an emphasis upon smokeless tobacco use, given its putative prevalence in athletes and its portrayal in professional sports. Further, focusing on direct impact of dangerous use practices (e.g., heavy episodic drinking, hangover effects) as well as on chronic use not only on "game day performance" but also on more routine conditioning, training and practice helps to place use consequences into the context of the daily routine and commitment of athletics. Stressing the special tasks associated with conditioning, training, and practice can be used to reinforce the incompatibility of any substance use with goals implied in the decision to engage in athletics. Focusing upon problems related to drug use encountered by professional and elite athletes would also likely help stimulate discussion. Unfortunately, there appears to be a relatively steady stream of media reports focusing upon the problems of such athletes. It would also be appropriate to identify positive role models among this target group. These emphases can also serve to reinforce other target mediators (e.g., values clarification, goal setting, norm setting, prosocial bonding). To the extent possible, it would be appropriate to mix didactic presentations with more interactive (e.g., discussion, experience sharing) formats. This interactive style theme is one that would be appropriately applied for all content area presentations given the action oriented personal style that characterizes athletically oriented adolescents. As discussed earlier, the use of peers to help present this material might enhance effectiveness.

2. *Decision-making regarding use*. Emphasis can be placed upon the fact that the decision to use or not to use is in fact an active choice. This can be placed within the context of the active and motivated choice and commitment each student has made to participate in athletic programs. This decision-making regarding use can be placed within the general context of making informed, conscious and non-destructive choices. In this regard, the fact that student-athletes presumably share a focused commitment can be used to advantage. Focus should be given to the incompatibility of the decisions and commitments involved in athletics (e.g., not only game day but expanded to conditioning, training and practice), along with the active decision to be substance free and the expectation that drug free and athletes should go together. This emphasis can be cast in the context of the athlete's decision balance. It would also seem advisable to outline highly likely scenarios that high school athletes may experience where opportunities to use

will occur. It may be useful to begin such discussions with "starter scenarios" (e.g., "you've just won/lost the big/rivalry game and are invited to a party where alcohol/drugs might be available"), moving on to scenarios generated by students themselves. The discussions should include the kinds of decisions people can and do make and the pros, cons and consequences of choices. Again, a guided interactive format would seem useful.

3. *Public commitment to prosocial goals.* Here again, the fact that there are explicit and implicit goals associated with the student's decision and commitment to athletic program involvement can be used to advantage. It would seem salient, appropriate and potentially efficacious to discuss what it means to be part of an athletic program and to ask students to consider committing to the "public" or in this case more specifically a "shared group norm" of an alcohol and drug free life style as part of a shared goal of athletic participation. Commitment to an alcohol and drug free life style can be couched in terms of its compatibility with pursuit of personal challenge and achievement and, in the case of team sports, the importance of shared goals and commitments. Discussion of the desirability of such a potentially shared commitment may lead to disclosure and discussion of potential ambivalences and set the stage for values clarification and goal setting.
4. *Values clarification regarding the place of an alcohol and drug free life style in the student athlete*. As with the previous targeted process, there are expressed and implied values ascribed to by students who choose to engage in athletic activities. These may often go unidentified or unexpressed until an event that appears to breach an implied value (e.g., failure of a drug test; loss of academic eligibility; poor practice habits). Values clarification has been viewed as a somewhat "weaker" (that is, less potent) component in more generic prevention activities. However, within the context of the potentially "shared values" of an athletic team or program, where values can be explicitly expressed and expected, it is plausible that identification and acceptance of a more well defined value structure provides an intervention opportunity. A discussion of values associated with a drug free life style can be interwoven with exercises and discussions regarding decision-making and commitment.
5. *Strategies for setting and attaining goals*. Ability to be forward looking, sustain motivation to plan for future prosocial involvement, and delay immediate gratification for future gains (which,

taken together, could be characterized as "positive planfulness") appear to be part of the profile of young people who seem to be "protected" from negative alcohol and drug related outcomes. Involvement in sports would seem to provide an excellent opportunity to shape and reinforce these characteristics inasmuch as responding to the challenges of athletic participation require these qualities. In the case of this potential mediator, the influence may be more indirect, that is, a focus upon specific substance abuse content may be secondary. On the other hand, it is probably worth infusing the idea that the ability of the aspiring athlete to achieve goals will be blunted by, and incompatible with, substance use involvement. Consideration of this potential protective element highlights another important aspect of prevention activities. Namely, opportunities to infuse a "prevention message" in activities that the target audience (in this case developing athletes) are invested in should be capitalized upon whenever possible. Often, these opportunities occur outside of formal programming such as classroom sessions. Maximizing potential effectiveness requires that individuals such as coaches should be sensitized to such "teachable" moments and are prepared to use these occasions.

6. *Stress management*. Management of the variety of demands placed upon the high school student requires skills that need to be mastered well before adulthood. High school athletes must not only learn ways to organize academic responsibilities, but must also be able to organize their time around conditioning, training, practice and participating in their sporting event. In addition, demands from many individuals (teachers, parents, coaches, teammates) add to the stress of an already busy, if not, turbulent adolescent life. Instruction in how to tap positive coping methods (including help seeking, cognitive reappraisal, distraction) and recognition of the pitfalls of negative coping methods (including substance use, anger outbursts and aggression) should be made available on an ongoing basis. Coping with stress should be viewed as a routine aspect of the athlete's experience and students need to understand that it is acceptable to reach out for assistance without stigma.
7. *Development of a sense of self-esteem and self worth*. The self-esteem construct has had an equivocal place in the history of substance abuse prevention programming. Once again, the potency of this construct like values clarification has been questioned. Most

recently, the concept has evolved to focus upon aspects of esteem that relate to the importance of developing self-efficacy, the sense that one can be effective in directing important and highly valued aspects of one's life. In this regard, improvement in self-efficacy has been related to increases in self-esteem. Clearly, athletic competition has the capacity to focus upon and strengthen the capacity of individual effort in shaping progress toward important goals. As was the case with goal setting, this influence would appear to be approachable indirectly with content about the incompatibility of drug use infused with the self-directed achievement message. It is probably worth recognizing, however, the importance of tempering the importance of the self-efficacy message with the knowledge that high school athletes may vary considerably in physical skills. Hence, it is important to emphasize the value and importance of academic and social skill development. It is not insignificant to note that for those high school athletes who do go on to higher levels of competition (e.g., college programs), athletic skills are not enough to be competitive; a balance of academic, mental and social skills are also important tools that should be emphasized.

8. *Development of core life skills*. Building the capacity to successfully negotiate conflict and improve communication with parents and other adults (including teachers and coaches) can help athletes to confront and resolve successfully interpersonal problems and situations that occur on a daily basis and to feel comfortable and competent in expressing feelings and ideas. Learning to deal with adults who are not parents is another important developmental milestone for the adolescent. This is another area where influences are likely to be indirect versus direct and where skills developed in working with coaches in athletic activities can be expected to transfer to "substance use opportunities" in which the student athlete must use interpersonal skills to resist pressures to engage in drug use.
9. *Development of resistance skills*. Building the capacity to adequately identify and repel interpersonal pressures to engage in a problem behavior (here, substance use) has been a mainstay of prevention programming. Activities to build resistance skills typically focus on role playing, using concepts of negotiation, as well as straight talk and refusal "sound bites" in getting the student to feel comfortable with confronting others who seek to persuade. As indicated above in the section upon life skills development,

many of the skills practiced in conflict negotiation and communication with adults can transfer to situations where peer contact may lead to opportunities to use. Development of resistance skills can be enhanced through realistic simulations where students are exposed to "high risk situations" and "practice" responses. In adapting these "high risk" use opportunity scenarios for the student athlete, rely upon the students themselves to characterize the situation. Further, as indicated above in the section on decision-making, students should be given the opportunity to discuss pros, cons and consequences of attempts to resist use. It would also be instructive for coaches to participate in such exercises in order to understand the pressures and situations imposing on students.

10. *Norm setting*. High school students may perceive that drinking and drug use are normative behaviors among teenage students that are simply part of the experience of "growing up." In fact, many young people perceive that substance use is more universal ("normative"), occurs with greater intensity ("more severe") among more individuals and that some forms of use are more benign ("less harmful") than is actually the case. In addition, many students inappropriately develop positive alcohol and drug use expectancies based upon their observations of both adults in their immediate environment, perceptions of popular role models (e.g., sports figures) and portrayals of use behavior in the mass media. Providing accurate feedback on the extent of a teen's own personal risk, actual risks and potential outcomes associated with use of specific substances, inaccurate expectancies about the use experience, and assessment of actual use (or heightened propensity or desire to use) in relationship to objective facts can and does reshape personal beliefs about use behaviors, modifies perceptions regarding use, modifies actual use behaviors and blunts propensity to escalate any drinking and drug taking behaviors (Larimer & Cronce, 2002). Thus, developing individual profiles for students ("taking their use inventory") provides the opportunity to reshape inappropriate norms about use and provides a backdrop for establishing appropriate norms about use. This process can be accomplished in an individual or group setting. Given the nature of the athletic experience (e.g., team cohesiveness and identity), we believe this process can be an effective method in developing positive team norms and can act to shape the team environment surrounding the substance use issue.

11. *Prosocial bonding and peer attachment*. For the student athlete, both the school and their team athletic experience provide an important, focused, and often intense socialization environment during their high school tenure. In many ways, affiliation and identification with the athletic program becomes a defining and enduring feature of the high school years. Achieving and maintaining an attachment to the identity of both student and athlete is an important developmental task and presents possibly a unique opportunity to influence decisions about use. Many youth experience a weakened feeling of connection to the school environment during the teenage years. Sub-groups such as student athletes often rely upon "local group norms" for guiding behavior. Hence, it becomes important for coaches and others who would shape positive behaviors to expose students to norm shaping experiences. Athletes can learn to connect and relate with prosocial, health conscious features of their team as well as to prosocial features of their school as a whole. In respect to substance use this means placing programming about substance abuse high on the priority list for discussion.
12. *Participation in alternative programs incompatible with substance use*. There is no question that one of the important hurdles for prevention programmers, including school psychologists, working with adolescents is the lack of prosocial extracurricular activities that can engage and hold student interest. In fact, given the difficult economic situations of many, if not all, high schools have significantly curtailed non-academic and extracurricular activities. One of the few areas that remain viable is participation in athletic and related programs (e.g., band, student trainers). Hence, the athletic venue remains a particularly important environment that promotes prosocial and often highly valued participation. Obviously, we believe that individuals who choose to participate in athletics are not immune from risk of substance use and abuse and related negative outcomes. As can be observed from our comments regarding mediators, we believe that there is a variety of prevention strategies that build upon the natural ecology of the athletic experience and that can be integrated within that experience. Further, we believe that many of the recommended prevention activities have the potential of enhancing the value of athletic participation by reducing risk and inducing protection. Finally, many of the recommended prevention activities are not only compatible with athletic participation but may act to maximize the benefit of athletics

for students well beyond that derived from competition and well beyond the high school years.

PERSPECTIVES ON DRUG TESTING AND SURVEILLANCE

Note that we have not recommended a role for surveillance using drug testing in our discussions of prevention strategies. We do anticipate that many administrators and coaches may wish to include drug testing as an element in their overall approach to prevention. As discussed above, the scientific jury is still out as regards the utility of drug testing especially considering the economic and potential psychological and social costs. More comprehensive assessments are currently underway. Clearly, there may be an added benefit in that testing may provide a deterrence that can suppress, at least for a time and in some circumstances and individuals, some forms of drug use. Recall, however, that most protocols are time limited in sensitivity, are limited in types of drugs detected, and do not typically include alcohol (the most commonly used substance by adolescents). In addition, such protocols must be carefully administered to achieve maximum benefit. Further, such surveillance may serve to detect breaches of abstinence within the physical limits of testing protocols. In those cases, programs must assume the responsibility of providing appropriate treatment interventions for violators. It is our recommendation that programs that choose to include drug testing seek appropriate consultation and work through the benefits and limitations of testing. Finally, we believe that drug testing, as a stand-alone intervention, is unlikely to provide a satisfactory prevention experience for either coaches or student athletes. We believe that drug testing, when employed, should be included as one element of a more comprehensive program that employs one or more of the many strategies we discuss above.

FINAL COMMENTS

Administrators, coaches and school psychologists seeking to develop solid evidenced based substance abuse programming for student athletes may be somewhat (if not completely!) overwhelmed by the comprehensive nature of program activities anticipated by our discussion of mediators and the myriad of potential activities that can be included in a prevention program. We have presented a wide range of possible

strategies that can be adopted by and adapted to the high school athletic environment. Obviously, we subscribe to the view that the more comprehensive a program (that is, one including elements and activities from all mediator domains), the more likely it is that the largest number of student athletes can be reached in the most efficacious manner. However, we recognize that many school environments may not have the resources required to implement fully a comprehensive program. We would encourage program developers and implementers to view our recommendations as a conceptual menu, a suggested series of components, from which they can choose those that map closely with their school environment and for which they can commit necessary resources. Further, we would recommend when they have implemented the "basic core" that they consider adding new components, as resources become available. Finally, we have not provided a detailed map of specific manuals or procedures, nor endorsed particular commercially available curricula that can be used to conduct programs. However, we have provided references to access such resources and, hopefully, some guidance as to how to choose elements that will help meet programming needs. Our last suggestion is that program developers and implementers avail themselves of the many resources available at the local, state and national level to guide in the selection and implementation of a program (e.g., NIDA, 2004; SAMHSA, 2003).

REFERENCES

Aaron, D.J., Dearwater, S.R., Anderson, R., Olsen, T., Kriska, A.N., & Laporte, R.E. (1995). Physical activity and the initiation of high-risk health behaviors in adolescents. *Medicine and Science in Sports and Exercise, 27*, 1639-1645.

Ammerman, R.T., Ott, P.J., Tarter, R.E., & Blackson, T.C. (1999). Critical issues in prevention of substance abuse. In R.T. Ammerman, P.J. Ott, & R.E. Tarter (Eds.), *Prevention and societal impact of drug and alcohol abuse* (pp. 3-20). Mahwah, NJ: Lawrence Erlbaum Associates.

Andersen, M.B. (1996). Working with college student-athletes. In J.L. Van Raalte, & B.W. Brewer (Eds.), *Exploring sport and exercise psychology* (pp. 317-334). Washington, DC: American Psychological Association.

Baer, J.S., Kivlahan, D.R., & Marlatt, G.A. (1995). High-risk drinking across the transition from high school to college. *Alcoholism: Clinical and Experimental Research, 19* (1), 54-61.

Baer, J.S., Kivlahan, D.R., Blume, A.W., McKnight, P., & Marlatt, G.A. (2001). Brief intervention for heavy drinking college students: Four-year follow-up and natural history. *American Journal of Public Health, 98,* 1310-1316.

Bell, R.M., Ellickson, P.L., & Harrison, E.R. (1993). Do drug-prevention effects persist into high school? How Project ALERT did with ninth graders. *Preventive Medicine, 22*, 463-483.

Berkowitz, A.D., & Perkins, H.W. (1986). Problem drinking among college students: A review of recent research. *Journal of American College Health, 35* (1), 21-28.

Botvin, G.J., Baker, E., Filazzola, A.D., & Botvin, E.M. (1990). A cognitive-behavioral approach to substance abuse prevention: One-year follow-up. *Addictive Behaviors*, *15*, 47-63.

Brewer, B.W. (1993). Self-identity and specific vulnerability to depressed mood. *Journal of Personality, 61*, 343-364.

Brown, J.H. (2001). Youth, drugs, and resilience education. *Journal of Drug Education, 31* (1), 83-122.

Brown, C.H., & Liao, J. (1999). Principles for designing randomized preventive trials in mental health: An emerging developmental epidemiology paradigm. *American Journal of Community Psychology, 27* (5), 673-710.

Buckley, W.E., Yesalis, C.E., Friedl, K.E., Anderson, W.A., Streit, A.L., & Wright, J.E. (1988). Estimated prevalence of anabolic steroid use among male high school seniors. *Journal American of the Medical Association, 260*, 3441-3445.

Caplan, M., Weissberg, R.P., Grober, J.S., Sivo, P.J., Grady, K., & Jacoby, C. (1992). Social competence promotion with inner-city and suburban young adolescents: Effects on social adjustment and alcohol use. *Journal of Consulting & Clinical Psychology*, *60*, 56-63.

Capone, T., McLaughlin, J.H., & Smith, F. (1973). Peer group leadership program in drug abuse prevention, 1970-1971 academic year. *Journal of Drug Education*, *3*, 201-246.

Carr, C., Kennedy, S., & Dimick, K. (1990). Alcohol use among high school athletes: A comparison of alcohol use and intoxication in male and female high school athletes and non-athletes. *Journal of Alcohol & Drug Education, 27* (3), 13-25.

Center for Substance Abuse Prevention. (1999). *Understanding substance abuse prevention. Toward the 21st century: A primer on effective programs.* Rockville, MD.

Coie, J.D., Watt, N.F., West, S.G., Hawkins, J.D., Asarnow, J.R., Markman, H.J., Ramey, S. L., Shure, M. B., & Long, B. (1993). The science of prevention: A conceptual framework and some directions for a national research program. *American Psychologist, 48* (10), 1013-1022.

Cuijpers, P. (2002). Peer-led and adult-led school drug prevention: A meta-analytic comparison. *Journal of Drug Education*, *32* (2), 107-119.

Dahnke, G., & Clastterbuck, G. (1990). *Human communication: Theory and research.* Belmont, CA: Wadsworth Publishing.

Danish, S. J., Petitpas, A.J., & Hale, B.D. (1993). Life development intervention for athletes: Life skills through sports. *Counseling Psychologist*, *21*, 352-385.

DeJong, W., & Langford, L.M. (2002). A typology for campus-based alcohol prevention: Moving toward environmental management strategies. *Journal of Studies on Alcohol, Suppl. 14,* 140-147.

Drug Strategies. (1996). *Making the grade: A guide to school prevention programs*. Washington, DC.

Durlak, J.A. (1995). School-based prevention programs for children and adolescents. In *Developmental Clinical Psychology and Psychiatry*. Thousand Oaks, CA: Sage Publications.

Ellickson, P.L., & Bell, R.M. (1990). Drug prevention in junior high: A multi-site longitudinal test. *Science*, *247*, 1299-1305.

Ennett, S.T., Ringwalt, C.L., Throne, J., Rohrbach, L.A., Vincus, A., Simons-Rudolph, A., & Jones, S. (2003). A comparison of current practice in school-based substance use prevention programs with meta-analysis findings. *Prevention Science, 4* (1), 1-14.

Epstein, J.A., Griffin, K.W., & Botvin, G. (2002). Positive impact of competence skills and psychological wellness in protecting inner city adolescents from alcohol use. *Prevention Science, 3* (2), 95-104.

Ewing, B.T. (1998). High school athletes and marijuana use. *Journal of Drug Education, 28* (2), 147-157.

Ferrante, A. P., & Etzel, E. (1991). *Counseling college student athletes: The problem, the need.* Morgantown, WV: Fitness Information Technology.

Foxcroft, D.R., Lister-Sharp, D., & Lowe, G. (1997). Alcohol misuse prevention for young people: A systematic review reveals methodological concerns and lack of reliable evidence of effectiveness. *Addiction*, *92* (5), 531-537.

Goldberg, L., Elliot, D.L., Clark, G., MacKinnon, D.P., Moe, E., Zoref, L., Green, C., Wolf, S.L., Greffrath, E., Miller, D.J., & Lapin, A. (1996). Effects of a multi-dimensional anabolic steroid prevention intervention: The A.T.L.A.S. (Adolescents Training and Learning to Avoid Steroids) Program. *Journal of the American Medical Association, 276*, 1555-1562.

Goldberg, L., Elliot, D.L., MacKinnon, D.P., Moe, E., Kuehl, K.S., Nohre, L., & Lockwood, C.M. (2003). Drug testing athletes to prevent substance abuse: Background and pilot study results of the SATURN (Student Athlete Testing Using Random Notification) study. *Journal of Adolescent Health, 1*, 16-25.

Gorman, D.M. (1998). The irrelevance of evidence in the development of school-based drug prevention policy, 1986-1996. *Evaluation Review, 22* (1), 118-146.

Gottfredson, D.C., & Wilson, D.B. (2003). Characteristics of effective school based substance abuse prevention. *Prevention Science, 4* (1), 27-38.

Green, E.K., Burke, K.L., Nix, C.L., Lanbrecht, K.W., & Mason, D.C. (1995). Psychological factors associated with alcohol use by high school athletes. *Journal of Sport Behavior, 18*, 195-208.

Grossman, S.J., & Smiley, E.B. (1999). APPLE: Description and evaluation of a substance abuse education and prevention program for collegiate athletics. *Journal of Primary Prevention*, *20*, 51-59.

Hansen, W.B. (1992). School-based substance abuse prevention: A review of the state of the art curriculum 1980-1990. *Health Education Research, 7* (3), 403-430.

Hansen, W.B., Johnson, C.A., Flay, B.R., Graham, J.W., & Sobel, J. (1988). Affective and social influences approaches to the prevention of multiple substance abuse among seventh grade students: Results from Project SMART. *Preventive Medicine*, *17*, 135-154.

Hawkins, J.D., Catalano, R.F., & Miller, J.Y. (1992). Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: Implications for substance abuse prevention. *Psychological Bulletin*, *112* (1), 64-105.

Hildebrand, K., Johnson, D. J., & Bogle, K. (2001). Comparison of patterns of alcohol use between high school and college athletes and non-athletes. *College Student Journal, 35* (3), 358-365.

Johnston, L.D., O'Malley, P.M., & Bachman, J.G. (2001). *Monitoring the Future national results on adolescent drug use: Overview of key findings, 2000*. (NIH Publication No. 01-4923). Bethesda, MD: National Institute on Drug Abuse.

Kleiber, D.A., & Brock, S.C. (1992). The effect of career ending injuries on the subsequent well-being of elite college athletes. *Sociology of Sport Journal, 9*, 70-75.

Kumar, R., O'Malley, P.M., Johnston, L.D., Schulenberg, J.E., & Bachman, J.G. (2002). Effects of school level norms on student substance use. *Prevention Science*, *3* (2), 105-124.

Labouvie, E., Pandina, R.J., & Johnson, V. (1991). Developmental trajectories of substance use in adolescence: Differences and predictors. *International Journal of Behavioral Development*, *14* (3), 305-328.

Larimer, M.E., & Cronce, J.N. (2002). Identification, prevention and treatment: A review of individual-focused strategies to reduce problematic alcohol consumption by college students. *Journal of Studies on Alcohol*, *14*, 148-163.

Lawler, J.M. (1971). Peer group approach to drug education. *Journal of Drug Education*, *1*, 63-76.

Leichliter, J., Meilman, P., Presley, C., & Cashin, J. (1998). Alcohol use and related consequences among college students with varying levels of involvement in college athletics. *Journal of College Health*, *46*, 257-262.

McGuire, R. (1990). *Athletes at risk: Drugs and Sport*. Dubuque, IA: Wm. C. Brown.

Melnick, M.J., Miller, K.E., Sabo, D.F., Farrell, M.P., & Barnes, G.M. (2001). Tobacco use among high school athletes and nonathletes: Results of the 1997 Youth Risk Behavior Survey. *Adolescence, 36* (144), 727-747.

Mezzich, A.C., Tarter, R.E., Lu, S., Giancola, P., Kirisci, L., & Parks, S. (1997). Substance use and risky sexual behavior in female adolescents. *Drug and Alcohol Dependence, 44*, 157-166.

Midford, R., Munro, G., McBride, N., Snow, P., & Ladzinski, U. (2002). Principals that underpin effective school-based education. *Journal of Drug Education*, *32* (4), 363-386.

Moskowitz, J.M. (1993). Why reports of outcome evaluations are often biased or uninterpretable. *Evaluation and Program Planning, 16*, 1-9.

Mrazek, P.J., & Haggerty, R.J. (Eds.). (1994). *Reducing the risk for mental disorders: Frontiers for preventive intervention research.* Washington, DC: National Academy Press for the Institute of Medicine, Committee on Prevention of Mental Disorders.

National Federation of High School Associations (2004). *NFHS 2003-04 High School Athletics Participation Survey.* Indianapolis, IN.

National Institute on Drug Abuse. (1995). *Drug use among racial/ethnic minorities* (DDHS Publications No. 95-3888). Washington, DC: US Government Printing Office.

National Survey of American Attitudes on Substance Abuse III. (1997). *Teens and their parents, teachers and principals*. The National Center on Addiction and Substance Abuse: Columbia University.

Nattiv, A., & Puffer, J.C. (1991). Lifestyles and health risks of collegiate athletes. *Journal of Family Practice, 33* (6), 585-590.

Naylor, A.H., Gardner, D., & Zaichkowsky, L. (2001). Drug use patterns among high school athletes and nonathletes. *Adolescence, 36* (144), 627-639.

NCAA Research Staff. (2001). *NCAA study of substance use habits of college student-athletes*. Presented to National Collegiate Athletic Association Committee on Competitive Safeguards and Medical Aspects of Sports.

Nelson, E.S. (1983). How the myth of the dumb jock becomes fact: A developmental view for counselors. *Counseling and Values, 27*, 176-185.

Nettles, S., Mucherah, W., & Jones, D. (2000). Understanding resilience: The role of social resources. *Journal of Education for Students Placed at Risk, 5* (1, 2), 47-60.

O'Neill, S.E., Parra, G.R., & Sher, K.J. (2001). Clinical relevance of heavy drinking during the college years: Cross-sectional and prospective perspectives. *Psychology of Addictive Behaviors, 15*, 350-359.

Pandina, R.J. (1998). Risk and protective factor models in adolescent drug use: Putting them to work for prevention. In *National Conference on Drug Abuse Prevention Research: Presentations, Papers, and Recommendations* (NIH Publication No. 98-4293, pp. 17-26). Washington, DC: National Institute on Drug Abuse.

Pandina, R.J., & Hendren, R.L. (1999). Other drugs of abuse: Inhalants, designer drugs, steroids. In B. McCrady & E. Epstein (Eds.), *Addictions: A comprehensive sourcebook for professionals* (pp. 171-184). New York, NY: Oxford University Press.

Petraitis, J., Flay, B.R., & Miller, T.Q. (1995). Reviewing theories of adolescent substance use: Organizing pieces in the puzzle. *Psychological Bulletin, 117* (1), 67-86.

Pinkerton, R.S., Hinz, L.D., & Barrow, J.C. (1989). The college student-athlete: Psychological considerations and interventions. *Journal of American College Health, 5*, 218-226.

Presley, C.A., Meilman, P.W., & Leichliter, J.S. (2002). College factors that influence drinking. *Journal of Studies on Alcohol Supplement*, *14,* 82-90.

Roberts-Wilbur, J.R., Wilbur, M., & Morris, J.R. (1987). The freshman athlete's transition: Athletic and academic stressors. *Academic and Athletic Journal*, 23-32.

Scheier, L.M. (2001). Etiologic studies of adolescent drug use: A compendium of data resources and their implications for prevention. *The Journal of Primary Prevention, 22* (2), 125-168.

Scheier, L.M., Botvin, G.J., & Baker, E. (1997). Risk and protective factors as predictors of adolescent alcohol involvement and transitions in alcohol use: A prospective analysis. *Journal of Studies on Alcohol*, *58*, 652-667.

Selby, R., Weinstein, H.M., & Bird, T.S. (1990). The health of university athletes: Attitudes, behaviors, and stressors. *Journal of American College Health*, *39*, 11-18.

Shields, E.W. (1995). Sociodemographic analysis of drug use among adolescent athletes: Observations-perceptions of athletic directors-coaches. *Adolescence, 30*, 839-861.

Shin, H.S. (2001). A review of school-based drug prevention program evaluations in the 1990's. *American Journal of Health Education, 32* (3), 139-147.

Sloboda, Z., & David, S.L. (1997). *Preventing drug use among children and adolescents. A research-based guide* (NIH Publication No. 97-4212). Washington, DC: National Institute on Drug Abuse.

Smart, R.G., Bennett, C., & Fejer, D. (1976). A controlled study of the peer group approach to drug education. *Journal of Drug Education*, *6* (4), 305-311.

Spence, J.C., & Gauvin, L. (1996). Drug and alcohol use by Canadian university athletes: A national survey. *Journal of Drug Education, 26*, 275-287.

Straus, R., & Bacon, S.D. (1953). *Drinking in College*. New Haven: Yale University Press.

Stuss, D. (1992). Biological and psychological development of executive functions. *Brain & Cognition*, *20*, 8-23.

Thombs, D.L. (2000). A test of the preconceived norms model to explain drinking patterns among university student athletes. *Journal of American College Health*, *49*, 75-83.

Tobler, N.S. (1992). Drug prevention programs can work: Research findings. *Journal of Addictive Diseases, 11*, 1-28.

Tobler, N.S. (1996). Meta-analysis of 143 adolescent drug prevention programs: Quantitative outcome results of program participants compared to a control or comparison group. *The Journal of Drug Issues*, *16* (4), 537-567.

Tobler, N.S., & Stratton, H.H. (1997). Effectiveness of school-based drug prevention programs: A meta-analysis of the research. *The Journal of Primary Prevention, 18* (1), 71-128.

Wechsler, H., Lee, J.E., Nelson, T.F., & Lee, H. (2001). Drinking levels, alcohol problems, and secondhand effects in substance-free college residences: Results of a national study. *Journal of Studies on Alcohol, 62,* 23-31.

Wechsler, H., Davenport, A.E., Dowdall, G.W., Grossman, S.J., & Zanakos, S.I. (1997). Binge drinking, tobacco, and illicit drug use and involvement in college athletics: A survey of students at 140 American colleges. *Journal of American College Health*, *45* (5), 195-200.

Weingardt, K.R., Baer, J.S., Kivlahan, D.R., Roberts, L.J., Miller, E.T., & Marlatt, G.A. (1998). Episodic heavy drinking among college students: Issues and longitudinal perspectives. *Psychology of Addictive Behaviors, 12,* 155-167.

Wilson, D.B., Gottfredson, D.C., & Najaka, S.S. (2001). School-based prevention problem behaviors: A meta-analysis. *Journal of Quantitative Criminology*, *17* (3), 247-272.

Wright, D., & Davis, T.R. (2001). *Youth substance use: State estimates from the 1999 National Household Survey on Drug Abuse.* (Analytical Series A-14). Rockville, MD: Substance Abuse and Mental Health Services Administration, Office of Applied Studies.