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The Adolescents Training and Learning to Avoid Steroids (ATLAS) Prevention Program: Background and Results of a Model Intervention

[Article]

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Abstract

Objective: To develop and test a school-based intervention to prevent anabolic androgenic steroid use among high-risk adolescent athletes.

Design: Nonrandom controlled trial.

Setting: Two urban high schools.

Participants: Fifty-six adolescent football players at the experimental school and 24 players at the control school.

Intervention: Eight weekly, 1-hour classroom sessions delivered by the coach and adolescent team leaders, and eight weight-room sessions delivered by research staff.

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Outline

The intervention addressed sports nutrition and strength training as alternatives to steroid use, drug refusal role play, and antisteroid media campaigns.

Outcome Measures: A preintervention and postintervention questionnaire that assessed attitudes toward and intent to use steroids and other drugs; knowledge of drug effects; and diet, exercise, and related constructs.

Results: Compared with controls, experimental subjects were significantly less interested in trying steroids after the intervention, were less likely to want to use them even if their friends used them, were less likely to believe steroid use was a good idea, believed steroids were more dangerous, had better knowledge of alternatives to steroid use, had improved body image, increased their knowledge of diet supplements, and had less belief in these supplements as beneficial.

Conclusions: Significant beneficial effects were found despite the sample size, suggesting that the effect of the intervention was large. This outcome trial demonstrates an effective anabolic androgenic steroid prevention program for adolescent athletes, and the potential of team-based interventions to enhance adolescents' health.

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Editor's Note: This preliminary study provides reason for great expectations of reduced anabolic androgenic steroid use among high-risk adolescent athletes. Adding the coach and peer leaders to the health care team might just be the key factor. I'm eagerly awaiting the long-term outcomes.

Catherine D. DeAngelis, MD

Although many investigators have studied the prevention of alcohol, tobacco, marijuana, and other illicit drug abuse, [1,2] there has been little research on the prevention of anabolic androgenic steroid (AAS) use. The National Institute on Drug Abuse recently sponsored its first study of a program to prevent adolescent anabolic steroid use. We report the background and results of this program's implementation.

BACKGROUND

Anabolic androgenic steroids are derivatives of the male hormone testosterone. Young adults and adolescents use AASs to improve athletic ability and muscular appearance, [3] despite the fact that these drugs have many potential adverse side effects. [4-14] Use of AASs

among high school athletes is currently a major national problem. [3,15] In previous research, we observed a steady increase in self-reported AAS use among Portland, Ore, high school football players, from 1.1% in 1987 [16] to 5.7% in 1991. [17]

Early adolescence may be a critical time to prevent AAS use, because youths may incorrectly interpret normal adolescent maturation as a benefit of AAS use. However, similar strength and muscle size gains may represent normal changes associated with the typical 10-fold increase in endogenous testosterone that occurs during male adolescence.

This school-based study targeted adolescent football players [18] because they are the high school group with the highest prevalence of AAS abuse [3,19] and since environmental influences (eg, teammates, coaches, and family) can be involved in a prevention program.

THEORETICAL MODEL OF AAS USE

We developed a theoretical model of AAS use (Figure 1), guided by previous AAS and other drug research findings. [16,20-26] We hypothesized that AAS use is a learned, goal-directed action, reinforced by individual, peer, family, and community or school influences. [27-32] Individuals are influenced by biologic mediators (eg, genetics); their knowledge, skills, and attitudes regarding AAS risks and benefits; and psychosocial characteristics.

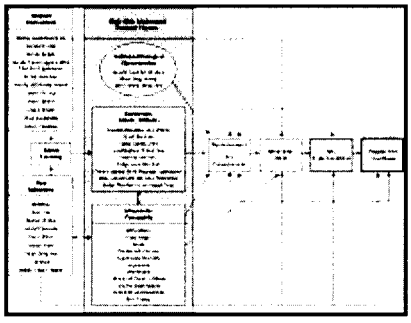

Figure 1. Proposed causative model of anabolic androgenic steroid (AAS) use. Rx indicates medication; SES, socioeconomic status.

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A significant set of potential AAS mediators relates to an adolescent's peer groups. Strong links exist among peer drug use and personal drug use. [26,29] Adolescent AAS users often overestimate AAS use prevalence among peers, [21] and a major reason for use was to become better liked by peers. [22] Conversely, negative peer reaction to drugs is a deterrent to drug abuse behaviors. [26]

Nonpeer and environmental pressures also affect AAS use. School pressure to "win at all costs" and student belief in greater parental acceptance of AASs are associated with adolescent

AAS use. [21] Other factors include family drug abuse, influences of school, coaches, media, and sports figures, socioeconomic factors, and drug availability. Adults may indirectly encourage AAS use by their ambivalence, as adolescent users report, "My parents probably know I have used steroids." [22] In another survey, more than 20% of AAS users reported that teachers or coaches actually encouraged use. [33]

Another nonpeer influence for adolescent AAS use is contact with individuals at nonschool (commercial) gyms. [22] The Department of Health and Human Services reports that commercial gyms are a source of steroid information for 75% of AAS users and a direct source for obtaining AASs for 63% of users. [22]

The risk of AAS use may potentially be affected by adolescents' knowledge, attitudes, and beliefs, such as understanding the social and physical consequences of AAS, [34] and personal susceptibilities to drug effects. [35] Among high-risk adolescents, critical knowledge deficits about steroid effects (testicular atrophy and stunted growth) and healthy alternatives (sports nutrition and athletic strength training) were associated with greater intent to use AAS. [36]

Psychosocial influences, such as low self-esteem, have also been suggested as drug abuse risk factors. [37] However, AAS users report feeling better about themselves, gaining self-esteem, and physical improvements as important reasons for initiating steroid use. [22] Teens who use other drugs often have goals that are antagonistic to adult values, [38,39] such as "getting high." In contrast, AAS users have certain goals that are prosocial (eg, "enhanced" appearance, athleticism, and attending college). To change attitudes regarding AAS use, a successful prevention program needs to provide healthy alternatives to reach these positive objectives.

Finally, the perceived effects of AAS can reinforce user behavior. Most current AAS users are satisfied with the results of use. [22] Gains in muscle mass and strength influenced 97% of AAS users to continue drug use, while former users were less enthusiastic about positive AAS effects. [22] However, if such healthy alternatives as sports nutrition and state-of-the-art strength training can be convincingly shown to increase muscular development and strength, then AAS use may be less desirable among this target group.

The intervention was designed to address each of these putative AAS risk factors (Figure 1). The classroom component employed successful strategies from drug prevention research [1,2] and our investigations of school-based AAS prevention. [16,23,25] Since "scare tactics" are ineffective, [40] a balanced risk-benefit approach was chosen. [16,23] Nutrition and strength training alternatives to AAS were also stressed, on the basis of evidence that these components may alter adolescents' intent to use AAS. [23]

HYPOTHESES

In this prospective, controlled study, we compared a school-based, AAS prevention program for high school football players with a no-intervention control condition. We hypothesized that

after the intervention, adolescents enrolled in the experimental intervention would exhibit (1) less intent to use AASs and other drugs; (2) more negative attitudes toward perceived benefits and reasons to use AASs; (3) lower rates of risk factors for AAS abuse; (4) increased knowledge of AAS effects; (5) increased knowledge of and higher rates of engaging in nutrition and strength training alternatives to AAS use; (6) greater perceived self-efficacy regarding alternatives to AAS; and (7) greater satisfaction with personal body image.

SUBJECTS AND METHODS

PROGRAM DESIGN

Two urban high schools participated: one school received the 8-week experimental prevention program, while the control school (96 km away) received no intervention. Experimental and control schools were similar with respect to total student enrollment (1471 vs 1640, respectively), 1993 football win-loss record (eight wins and one loss vs seven wins and two losses), family socioeconomic status, school attendance (89.6% vs 91.8%), average parental education (median of some college for both), and student participation in the free lunch program (26.6% vs 27.2%).

SUBJECTS

A total of 173 varsity football players at the two high schools were invited to participate. Subjects and parents or guardians signed a letter of informed consent. Of the 90 adolescents eligible to participate in the experimental condition, 66 (73.3%) consented, compared with 54 (65.1%) of 83 adolescents on the control school team (chi squared [1]=1.4, P>.05).

RETENTION

Fifty-six (84.8%) of the 66 experimental subjects and 24 (44.4%) of the 54 control subjects participated in both assessments, for an overall retained sample of 80 students. This was a significant difference in participation across conditions (chi squared [1]=21.8, P<.001). Because the majority of consenting but nonparticipating adolescents failed to complete the baseline questionnaire, we could not examine how they differed from retained subjects. Nonetheless, this difference suggests caution when outcome findings are interpreted.

DEMOGRAPHICS

All participants were male. (Table 1) presents the demographics for retained subjects, by condition. Neither parental employment nor parental education was significantly different across conditions. Although median family income was $30 000 to $40 000 for adolescents in the experimental group vs $20 000 to $30 000 for control subjects, this was not a significant difference across the complete samples.

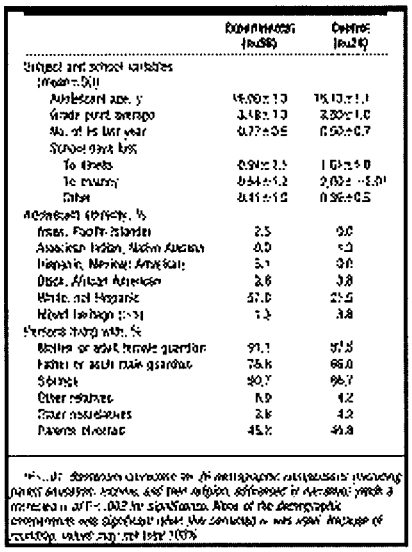

Table 1. Demographic Characteristics in Control and Experimental Subjects Retained From Intake to Postintervention Assessments

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Significant differences between participants at the two schools were found only for truancy days (P<.01). However, one significant difference among 26 comparisons is consistent with chance (with a Bonferroni-corrected alpha of P<.002).

ASSESSMENT

All participants were assessed twice, 9 weeks apart: just before the first intervention session, and in the week after the final intervention session. Confidential, code-numbered questionnaires were administered by research staff in group sessions at schools. Parents, coaches, and other school personnel were not present during the assessment and did not have access to questionnaires or the coding list. Subjects in both conditions were provided with a free movie theater pass each time they completed the questionnaire. Adolescents who participated in the experimental protocol also received T-shirts with the research study logo.

SELF-REPORT QUESTIONNAIRE

The principal assessment instrument was a 299-item, self-report questionnaire, developed for this investigation with the use of items employed in earlier studies. [6,22,23] Most of the 299 individual items or questions were combined into different factors, each factor representing a construct of interest from the causative model (Figure 1). Most constructs were measured by a minimum of three individual questions. The questionnaire assessed AAS and other drug use, attitudes, and behavioral intent to use AAS. Items that evaluated the use of other illicit drugs and alcohol were from ongoing, national surveys of American high school seniors. [41] Other constructs assessed included knowledge of nutrition and exercise and norms of drug use; exercise and dietary patterns; peer tolerance of AAS and other drug use and support of health-

promoting behaviors; body image; self-esteem; need for achievement; mood (eg, depression and anxiety); anger and impulsivity; and subjective satisfaction with the components of the intervention. (Table 2) summarizes the generally positive psychometric properties of constructs measured by this instrument.

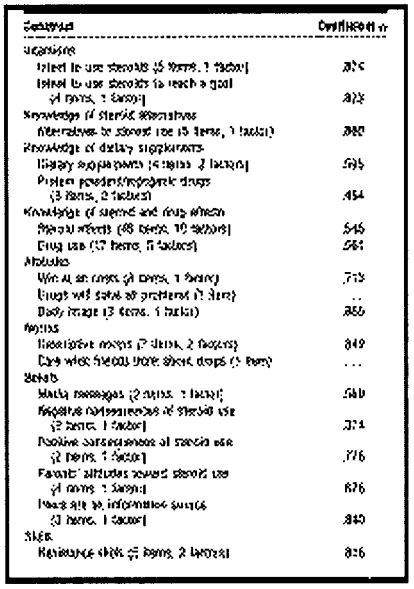

Table 2. Internal Consistency of Constructs in Self-Report Questionnaire

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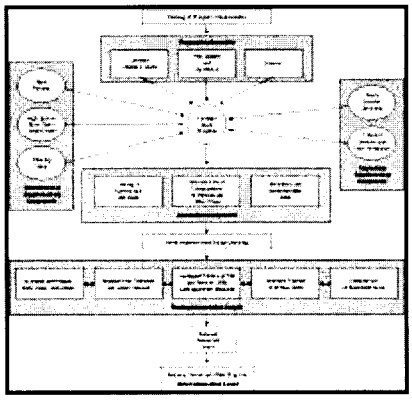
PREVENTION INTERVENTION

The intervention scheme is shown in (Figure 2). The program consisted of 16 sessions over 8 weeks. Eight weekly, 1-hour sessions were held in a classroom setting, delivered by the coach and peer leaders. Classroom sessions were observed by research staff to confirm coach and peer-leader adherence to the protocol. On the same day each week, another eight sessions were delivered in the high school weight room by Adolescents Training and Learning to Avoid Steroids staff skilled in weight lifting instruction.

Figure 2. Model of anabolic androgenic steroid prevention intervention.



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Classroom

The eight classroom sessions addressed the topics listed in (Table 3). Instruction addressed alternatives to AAS use, ie, sports nutrition and proper strength training techniques. Previous data suggest that intent to use AASs is lowered with this approach, with the greatest impact on those with higher initial desire to use these substances. [23] Refusal skills to decline offers of AASs or other illicit drugs [42,43] were taught and practiced, as similar strategies have been successful in reducing smoking rates in teens. [43] Students also prepared anti-AAS media messages (ie, posters and mock television and radio announcements). Approximately 60% of the curriculum was peer-led, as this appears to increase program effectiveness. [42,44] The objectives of the weight room curriculum also were reviewed in the classroom component.

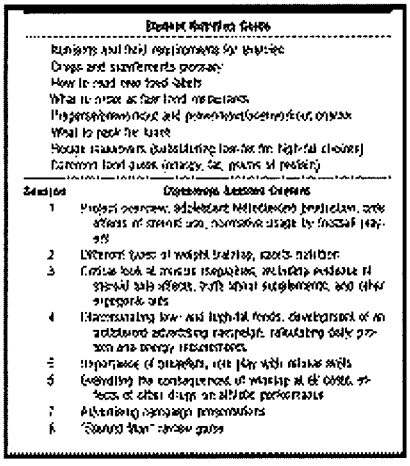

Table 3. Content of the Anabolic Androgenic Steroid Prevention Intervention

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A major emphasis of the sports nutrition component was to have athletes consume adequate amounts of total energy and protein. A pocket-sized sports nutrition guide, summarized in (Table 3), emphasized dietary intake for adolescent athletes in the program. This included recommendations for adequate energy intake, lower fat (<30% of total energy intake), higher carbohydrates, and relatively high protein (approximately twice the recommended dietary allowance of 0.8 g/kg of body weight for sedentary adults). Nutritional supplements and drugs also were reviewed, factual information was presented, and inflated claims for these products were debunked.

Weight Room

The intervention provided additional weight room equipment (retail value, approximately $3000) to supplement and enhance the experimental high school training facility. By enhancing the school weight room, we sought to keep adolescents exercising in a school-supervised environment with less outside influence. Eight weekly 1-hour weight-room sessions promoted skill training. Sessions were divided into three different phases. The initial phase (sessions 1 through 3) promoted muscular endurance with low-weight, high-repetition weight lifting. The second phase (sessions 4 through 6) focused on higher-weight and lower-repetition training for strength. The last phase (sessions 7 and 8) concentrated on power exercises, including demonstrations of plyometric techniques.

Parents

Parents and guardians of student athletes were involved via their son's homework assignments and a single 1.5-hour evening parent meeting on program goals, facilitated by Adolescents Training and Learning to Avoid Steroids staff. Parents received a family sports nutrition booklet similar to the adolescents' guide.

Implementer Training

Peer leaders were selected by coaches and trained by research staff to facilitate small-group activities during each classroom session. Coaches also presented information and supervised the sessions. Coach and team leader manuals provided step-by-step instructions and activities. We employed peer leaders because they have been found to be reliable sources of information [44] and in other drug prevention studies were associated with reduced subject drug use. [31,45] Also, our previous research [25] documented a high degree of acceptability of peer leaders in the team setting.

CONTROL CONDITION

The control school football team received none of the components described above. Informal postintervention debriefing of the control school coaches showed that no other anabolic steroid materials or teachings were provided to students during the course of the investigation.

DATA ANALYSIS

Because of some group difference at baseline, and because subjects were not randomly assigned to treatments, it is important to test program effects under different assumptions about how the schools would change in the absence of program exposure. The program effects were tested under two assumptions about the change in the dependent measure over time if the program had no effect. [46] The first method, the conditional model, tests for effects assuming that the dependent variable in each condition would regress to mean levels. The second method, the unconditional model, tests for effects assuming that group differences will not change over time. In the conditional model, the posttest dependent variable is regressed on the program exposure variable. In the unconditional model, the difference between posttest and pretest findings is the dependent variable. The most convincing program effects are those that are significant under both models.

RESULTS

(Table 4) presents baseline equivalence and program effect estimates for seven dependent variables of intentions, knowledge, attitudes, norms, beliefs, and skills. There are several individual constructs under each of these seven headings. The statistical significance between the groups at baseline and the statistical significance of the program effects are shown in this table.

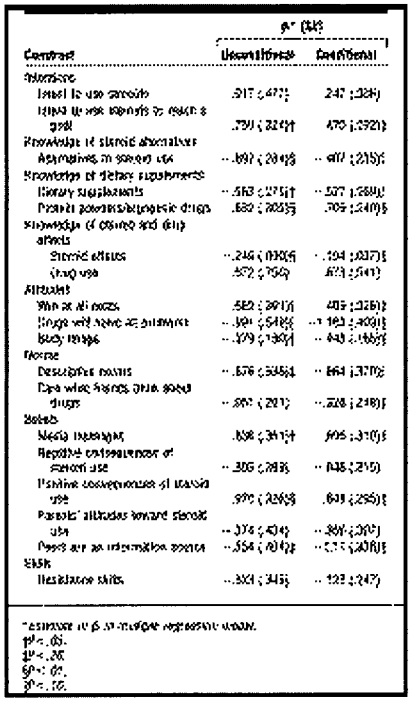

Table 4. Conditional and Unconditional Program Effects

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BASELINE EQUIVALENCE

The only demographic variable that differed between program and control groups was student truancy. As shown in (Table 4), several of the dependent measures also were significantly different between program and control groups at baseline (indicated by footnotes). There were differences between groups in knowledge of alternatives to AAS use, beliefs that AASs are not dangerous, knowledge of energy content in foods, peer tolerance of drug use, and norms among friends. These baseline differences make it important to test for program effects with alternative methods to adjust for baseline differences.

PROGRAM EFFECTS

The effect of the Adolescents Training and Learning to Avoid Steroids intervention was assessed by observing change in the constructs predicted to be affected by the program, as detailed in the causative model (Figure 1). Also evaluated were constructs presumed to remain stable over time (eg, socioeconomic status, peer drug use, media or professional athlete influences, etc).

As described in the analysis section, program effects were estimated with unconditional and conditional analytic models. These program effect estimates and their statistical significance are shown in (Table 4). The means for individual constructs are shown in (Table 5). Because of hypotheses predicting positive intervention effects on the dependent variables, we use one-tailed tests (alpha=.05) for the level of statistical significance. Although significant program effects were not observed for all constructs, the direction of most of the effects was consistent with positive program effects. In many cases there were crossover effects such that the program group was higher at baseline but lower than the control group at the posttest evaluation.

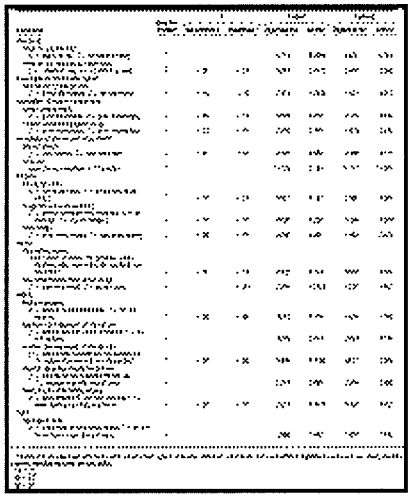

Table 5. Adolescents Training and Learning to Avoid Steroids Construct Means*

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Knowledge

There were substantial beneficial program effects on many of the eight knowledge measures, including knowledge of alternatives to AAS use, knowledge of dietary supplements, protein powders, and ergogenic drugs, factors influencing AAS use, the effects of steroids, and knowledge of drug use in general. Although there were no significant program effects on knowledge of proper exercise techniques or energy intake from food, the pattern of effects was in the correct direction (favoring the students in the intervention group).

Attitudes

There were substantial program effects on several of the six attitude measures, including the "win at all costs" attitude, and drugs as a way to solve all problems. There was evidence of a program effect for drugs as a way to lose weight and others' attitudes about losing.

Intentions

For both intentions measures, intervention students became less likely to intend to use AASs, while control students were even more likely to intend to use AASs. The important construct "intent to use AASs as a reward" (ie, for obtaining a college scholarship or a first-team position) had a statistically significant program effect.

Body Image

Under both analysis models, players exposed to the intervention were more likely than control players to increase their belief that they had a "good" body.

Norms of AAS/Drug Use

The student's perception of the number of other persons who use AAS showed a significant, positive program effect. The effects for other norms, and peer tolerance of drugs, were in the correct direction but did not reach a significant level. The extent to which respondents learned about AAS and other drug use prevention from their peers increased more among intervention subjects than control subjects.

Skills

Program effects on resistance skills measures were in the desired direction but were not statistically significant.

Beliefs

Beliefs about the media's influence on AAS use and beliefs about the positive consequences of AAS use had large and statistically significant program effects. Other beliefs, such as reasons not to use AASs, beliefs about penalties for AAS, and beliefs about parent attitudes regarding AAS, were not significantly affected by the program. Preintervention and postintervention scores

for these constructs suggest that these beliefs were well understood by the intervention group before the Adolescents Training and Learning to Avoid Steroids program.

COMMENT

We describe a theoretical model for AAS use, a prevention program to reduce putative risk factors for use of AASs by adolescent athletes, and the positive results of an initial trial of this intervention. A strength of this program is that it was delivered by the coach and peer leaders in the high school setting, with the use of scripted manuals. Although the weight training instructor was provided by the study's investigators, the remainder of the intervention was school supported and delivered. This suggests that this intervention may be easily implemented in schools outside of an experimental study.

Despite the relatively small sample, significant effects were detected, suggesting that the magnitude of the intervention is high. The lowered intentions to use AASs among subjects in the intervention school are encouraging. Many positive effects were noted for constructs central to the theory underlying the prevention program, including knowledge of AAS effects, improved body image, developing more realistic norms regarding AAS use, improved understanding of alternatives to AAS, and less reliance on supplement powders and pills.

Conclusions about the long-term effects of our intervention on AAS use, and the impact of mediating factors on outcome, will require a larger sample and a longer follow-up period. We are currently in the first year of a 4-year randomized outcome study, in which we are applying the results of this initial trial to a much larger population of approximately 3500 to 4000 student-athletes in 31 high schools.

Some factors may limit our confidence in these results. These include the sample size, the use of one school per condition, and differences in retention between control and experimental conditions. Other factors, such as high preintervention levels of AAS knowledge and highly negative beliefs regarding AAS use, suggest that it would be even more difficult to have significant program effects in this sample of athletes. This preintervention "ceiling effect" in anti-AAS knowledge and attitudes suggests that the greatest program effects will be found in students who have fewer negative beliefs and attitudes about AAS use and less knowledge. This trial appears to be a significant step toward the development of an effective AAS prevention program for adolescent athletes.

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REFERENCES

1. Bukoski WJ. A framework for drug abuse prevention research. NIDA Res Monogr. 1991;107:7-28. **ExternalResolverBasic**| **Bibliographic Links**| [Context Link]

2. Flay BR. Efficacy and effectiveness of trials (and other phases of research) in the development of health promotion programs. Prev Med. 1986;15:451-474. **ExternalResolverBasic**| **Bibliographic Links**| [Context Link]

3. Buckley WE, Yesalis CE, Friedl KE, Anderson KA, Streit AL, Wright JE. Estimated prevalence of anabolic steroid use among male high school seniors. JAMA. 1988;260:3441-3445. **ExternalResolverBasic**| **Full Text**| **Bibliographic Links**| [Context Link]

4. Shephard RJ, Killinger D, Fried T. Responses to sustained use of anabolic steroid. Br J Sports Med. 1977;11:170-173. **ExternalResolverBasic**| **Bibliographic Links**| [Context Link]

5. Mokrohisky ST, Ambruso DR, Hathaway WE. Fulminant hepatic neoplasia after androgen therapy. N Engl J Med. 1977;296:1411-1412. **ExternalResolverBasic**| **Bibliographic Links**| [Context Link]

6. Johnson FL. Hepatoma associated with androgenic steroids. Lancet. 1975;1:1294-1295. **ExternalResolverBasic**| **Bibliographic Links**| [Context Link]

7. McDonald EC, Speicher CE. Peliosis hepatitis associated with administration of oxymetholone. JAMA. 1978;240:243-244. **ExternalResolverBasic**| **Full Text**| **Bibliographic Links**| [Context Link]

8. Frankle MA. Anabolic-androgenic steroids: a guide for the physician. J Musculoskel Med. 1989;6:69-88. [Context Link]

9. Pope HG, Katz DL. Affective and psychotic symptoms associated with anabolic steroid use. Am J Psychiatry. 1988;145:487-490. **ExternalResolverBasic**| **Bibliographic Links**| [Context Link]

10. Webb OL, Laskarzewski PM, Guleck CJ. Severe depression of high-density lipoprotein cholesterol levels in weight lifters and body builders by self-administered exogenous testosterone and anabolic-androgenic steroids. Metabolism. 1984;33:971-975. [Context Link]

11. Messerli FH, Frohlich ED. High blood pressure: a side effect of drugs, poisons, and food. Arch Intern Med. 1979;139:682-687. **ExternalResolverBasic**| **Full Text**| **Bibliographic Links**| [Context Link]

12. Sklarek HM, Mantovani RP, Erens E, Heisler D, Diederman MS, Gein AM. AIDS in a bodybuilder using anabolic steroids. N Engl J Med. 1984;311:1701. [Context Link]

13. Strauss RH, Wright JE, Finerman GAM, Catlin DH. Side effects of anabolic steroids in weight-trained men. Phys Sports Med. 1983;11(12):87-96. [Context Link]

14. Moore WV. Anabolic steroid use in adolescence. JAMA. 1988;260:3484-3486. **ExternalResolverBasic**| **Full Text**| **Bibliographic Links**| [Context Link]

15. Johnson MD, Jay MS, Shoup B, Rickert VI. Anabolic steroid use by male adolescents. Pediatrics. 1989;83:921-924. **ExternalResolverBasic**| **Bibliographic Links**| [Context Link]

16. Goldberg L, Bosworth E, Bents R, Trevisan L. Effect of an anabolic steroid education program on knowledge and attitudes of football players. J Adolesc Health Care. 1990;11:210-214. **ExternalResolverBasic| Bibliographic Links|** [Context Link]

17. Cleary B, Folker R, Thompson H, Jarrett G, Goldberg L. Increasing adolescent steroid use: 5 year data. Med Sci Sports Exerc. 1992;24:S45. Abstract. [Context Link]

18. Gilchrist LD. Defining the intervention and the target population. NIDA Res Monogr. 1991;107:13-44. [Context Link]

19. Anderson WA, Albrech RR, McKeag DB, Hough DO, McGrew CA. A national survey of alcohol and drug use by college athletes. Phys Sports Med. 1991;19:91-104. **ExternalResolverBasic| Bibliographic Links|** [Context Link]

20. Carlson H, Cleary B, Carlson N, et al. Ergogenic drugs among high school athletes: trends in knowledge and abuse. Med Sci Sports Exerc. 1991;23:S18. Abstract. [Context Link]

21. Folker R, Ganter B, Cleary B, Carlson H, Elliot D, Goldberg L. Adolescent anabolic steroid users vs. nonusers: differences in knowledge and attitudes. Med Sci Sports Exerc. 1992;24:S44. Abstract. [Context Link]

22. Office of Inspector General. Adolescent Steroid Use. Washington, DC: Dept of Health and Human Services; 1991. Publication OEI-06-90-01080. [Context Link]

23. Bents R, Young J, Bosworth E, Boyea S, Elliot D, Goldberg L. An effective educational program alters attitudes toward anabolic steroid use among adolescent athletes. Med Sci Sports Exerc. 1990;22:S64. Abstract. [Context Link]

24. Jarrett G, Cleary B, Bents R, et al. Beliefs and behaviors of adolescent athletes v nonathletes: drugs, nutrition and strength training. Med Sci Sports Exerc. 1991;23:S19. Abstract. [Context Link]

25. Jarrett G, Ganter B, Carlson H, et al. Peer delivered anabolic steroid education: adolescent acceptability and outcomes. Med Sci Sports Exerc. 1992;24:S44. Abstract. [Context Link]

26. MacKinnon DP, Johnson CA, Pentz MA, et al. Mediating mechanisms in a school based drug prevention program: first-year effects of the Midwestern Prevention Project. Health Psychol. 1991;10:164-172. **ExternalResolverBasic| Bibliographic Links|** [Context Link]

27. Bandura A. Social Learning Theory. Englewood Cliffs, NJ: Prentice Hall; 1977. [Context Link]

28. Fishbein M, Ajzen I. Belief, Attitude, Intention and Behavior. Reading, Mass: Addison-Wesley; 1975. [Context Link]

29. Jessor R, Jessor SL. Problem Behavior and Psychosocial Development. New York, NY: Academic Press; 1977. [Context Link]

30. Fishbein M, Ajzen I. Belief, Attitudes, Intention and Behavior: An Introduction to Theory and Research. Reading, Mass: Addison-Wesley; 1975. [Context Link]

31. Flay BR, Ryan KB, Best JA, et al. Are social-psychological smoking prevention programs effective? The Waterloo study. J Behav Med. 1985;8:37-59. **ExternalResolverBasic| Bibliographic Links|** [Context Link]

32. Pentz MA, Trebow E. Implementation issues in drug abuse prevention research. NIDA Res Monogr. 1991;107:123-139. **ExternalResolverBasic| Bibliographic Links|** [Context Link]

33. Gaa GL, Griffith EH, Cahill BR, Tuttle LD. Prevalence of anabolic steroid use among Illinois high school students. J Ath Training. 1994;29:216-222. [Context Link]

34. Huba GJ, Bentler PM. A developmental theory of drug use: derivation and assessment of a causal modeling approach. In: Baltes BP, Brim OG Jr, eds. Life-span Development and Behavior. New York, NY: Academic Press; 1982;4:147-203. [Context Link]

35. Smith GM. Perceived effects of substance use: a general theory. In: Theories on Drug Abuse: Selected Contemporary Perspectives. NIDA Res Monogr. 1980;30:50-58. **ExternalResolverBasic| Bibliographic Links**| [Context Link]

36. Thompson H, Cleary B, Folker R, Carlson N, Elliot D, Goldberg L. Adolescent athletes and anabolic steroid abuse: features that characterize the potential user. Med Sci Sports Exerc. 1991;23:S18. Abstract. [Context Link]

37. Hawkins JD, Lishner DM, Catalono RF, Howard MO. Childhood predictors of adolescent substance abuse: toward an empirically grounded theory. In: Griswold-Ezekeye S, Kemfer K, Bukoski W, eds. Children and Clinical Abuse: Prevention and Intervention. New York, NY: Haworth Press; 1986:11-48. [Context Link]

38. Jacobson GR, Ritter DP, Mueller L. Purpose in life and personal values among adult alcoholics. J Clin Psychol. 1977;33:314-316. **ExternalResolverBasic| Bibliographic Links**| [Context Link]

39. Robins LN. Sturdy childhood predictors of adult antisocial behavior: replications from longitudinal studies. Psychol Med. 1978;8:611-622. [Context Link]

40. Goldberg L, Bents R, Bosworth E, Trevisan L. Do scare tactics work?. Pediatrics. 1991;87:283-286. [Context Link]

41. Johnston LD, O'Malley PM, Bachman JG. Psychotherapeutic, licit and illicit use of drugs among adolescents. J Adolesc Health Care. 1987;8:36-51. **ExternalResolverBasic| Bibliographic Links**| [Context Link]

42. Botvin GJ. Substance abuse prevention research: recent developments and future directions. J School Health. 1986;56:37-59. [Context Link]

43. Ary D, Biglan A, Glasgow R, Zoref L, et al. The efficacy of social influence programs versus "standard care': are new initiatives needed?. J Behav Med. 1990;13:281-296. **ExternalResolverBasic| Bibliographic Links**| [Context Link]

44. Klepp KL, Halper A, Perry CL. The efficacy of peer leaders in drug abuse prevention. J School Health. 1986;56:407-411. [Context Link]

45. Botvin HG, Baker E, Filzzola AD, Botvin EM. A cognitive-behavioral approach to substance abuse prevention: one-year follow-up. Addict Behav. 1990;15:47-63. **ExternalResolverBasic| Bibliographic Links**| [Context Link]

46. Dwyer JH, MacKinnon DP, Pentz MA, et al. Estimating intervention effects in longitudinal studies: the Midwestern Prevention Project. Am J Epidemiol. 1989;130:781-795. **ExternalResolverBasic| Bibliographic Links**| [Context Link]

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