ARTICLE

The Adolescents Training and Learning to Avoid Steroids (ATLAS) Prevention Program

Background and Results of a Model Intervention

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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. 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.

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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,

See Subjects and Methods on next page

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 ($\chi^2[1]=1.4$, $P>.05$).

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 ($\chi^2[1]=21.8$, $P<.001$). 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.

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 α 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.

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

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

school weight room by Adolescents Training and Learning to Avoid Steroids staff skilled in weight lifting instruction.

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.

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.

attitudes regarding AAS risks and benefits; and psychosocial characteristics.

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

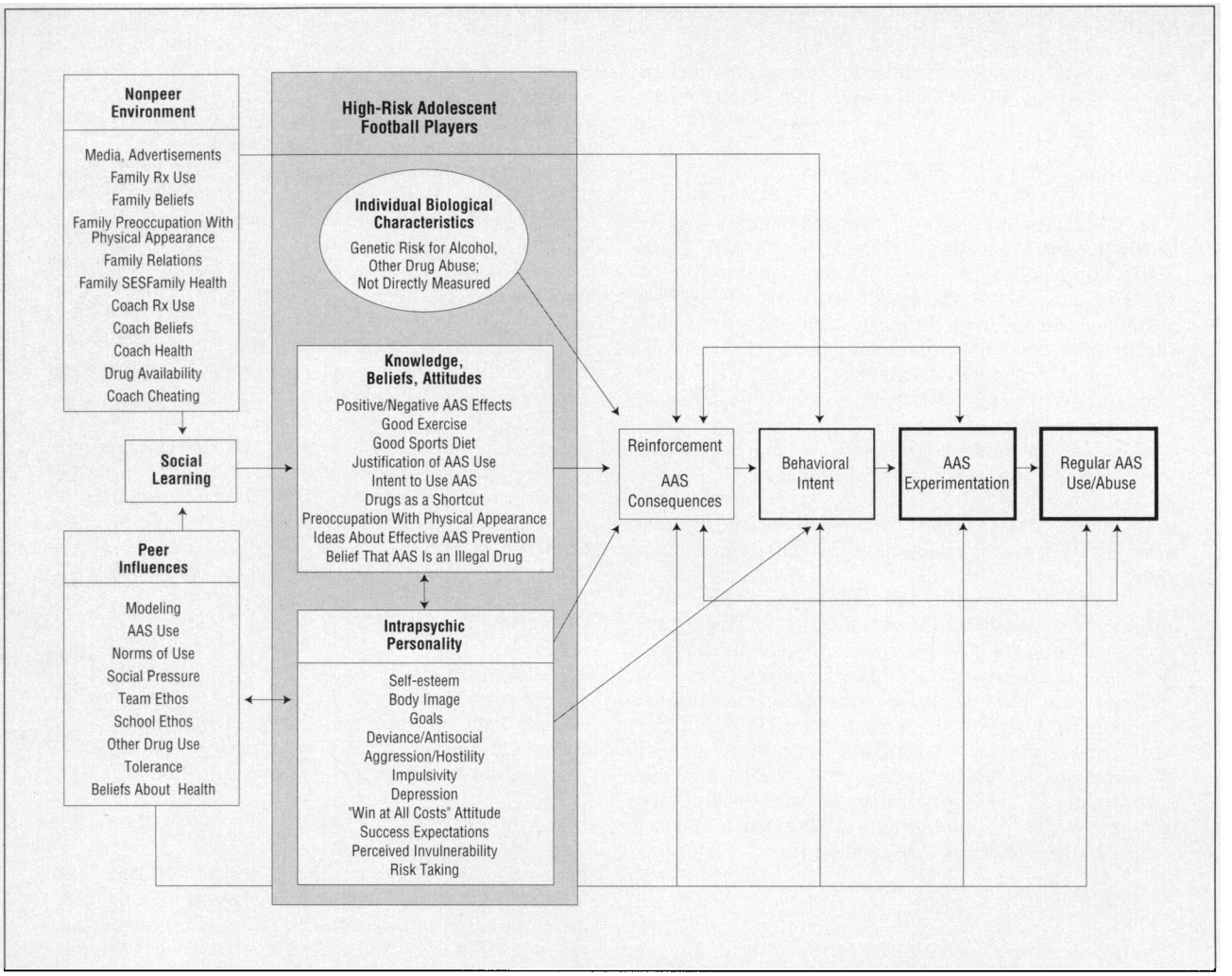

Figure 1. *Proposed causative model of anabolic androgenic steroid (AAS) use. Rx indicates medication; SES, socioeconomic status.*

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 en-

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

	Experimental (n=56)	Control (n=24)
Subject and school variables (mean±SD)		
Adolescent age, y	16.00±1.3	16.13±1.1
Grade point average	3.18±1.3	3.50±1.0
No. of Fs last year	0.27±0.5	0.50±0.7
School days lost		
To illness	0.94±1.1	1.61±1.8
To truancy	0.64±1.2	2.00±−2.0*
Other	0.41±1.0	0.39±0.5
Adolescent ethnicity, %		
Asian, Pacific Islander	2.5	0.0
American Indian, Native Alaskan	0.0	1.3
Hispanic, Mexican American	5.1	0.0
Black, African American	3.8	3.8
White, not Hispanic	57.0	21.5
Mixed heritage (>1)	1.3	3.8
Persons living with, %		
Mother or adult female guardian	91.1	87.5
Father or adult male guardian	76.8	66.6
Siblings	60.7	66.7
Other relatives	8.9	4.2
Other nonrelatives	3.6	4.2
Parents divorced	48.2	45.8

*P<.01. Bonferroni correction for 26 demographic comparisons (including parent education, income, and teen religion, addressed in narrative) yields a corrected α of P<.002 for significance. None of the demographic comparisons was significant when this corrected α was used. Because of rounding, values may not total 100%.

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

Construct	Coefficient α
Intentions	
Intent to use steroids (5 items, 1 factor)	.874
Intent to use steroids to reach a goal (4 items, 1 factor)	.823
Knowledge of steroid alternatives	
Alternatives to steroid use (5 items, 1 factor)	.860
Knowledge of dietary supplements	
Dietary supplements (4 items, 2 factors)	.595
Protein powders/ergogenic drugs (3 items, 2 factors)	.484
Knowledge of steroid and drug effects	
Steroid effects (45 items, 10 factors)	.545
Drug use (17 items, 5 factors)	.561
Attitudes	
Win at all costs (3 items, 1 factor)	.713
Drugs will solve all problems (1 item)	...
Body image (3 items, 1 factor)	.865
Norms	
Descriptive norms (7 items, 2 factors)	.849
Care what friends think about drugs (1 item)	...
Beliefs	
Media messages (2 items, 1 factor)	.569
Negative consequences of steroid use (2 items, 1 factor)	.374
Positive consequences of steroid use (2 items, 1 factor)	.778
Parents' attitudes toward steroid use (4 items, 1 factor)	.676
Peers are an information source (3 items, 1 factor)	.840
Skills	
Resistance skills (5 items, 2 factors)	.816

rolled 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.

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.

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 (α=.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

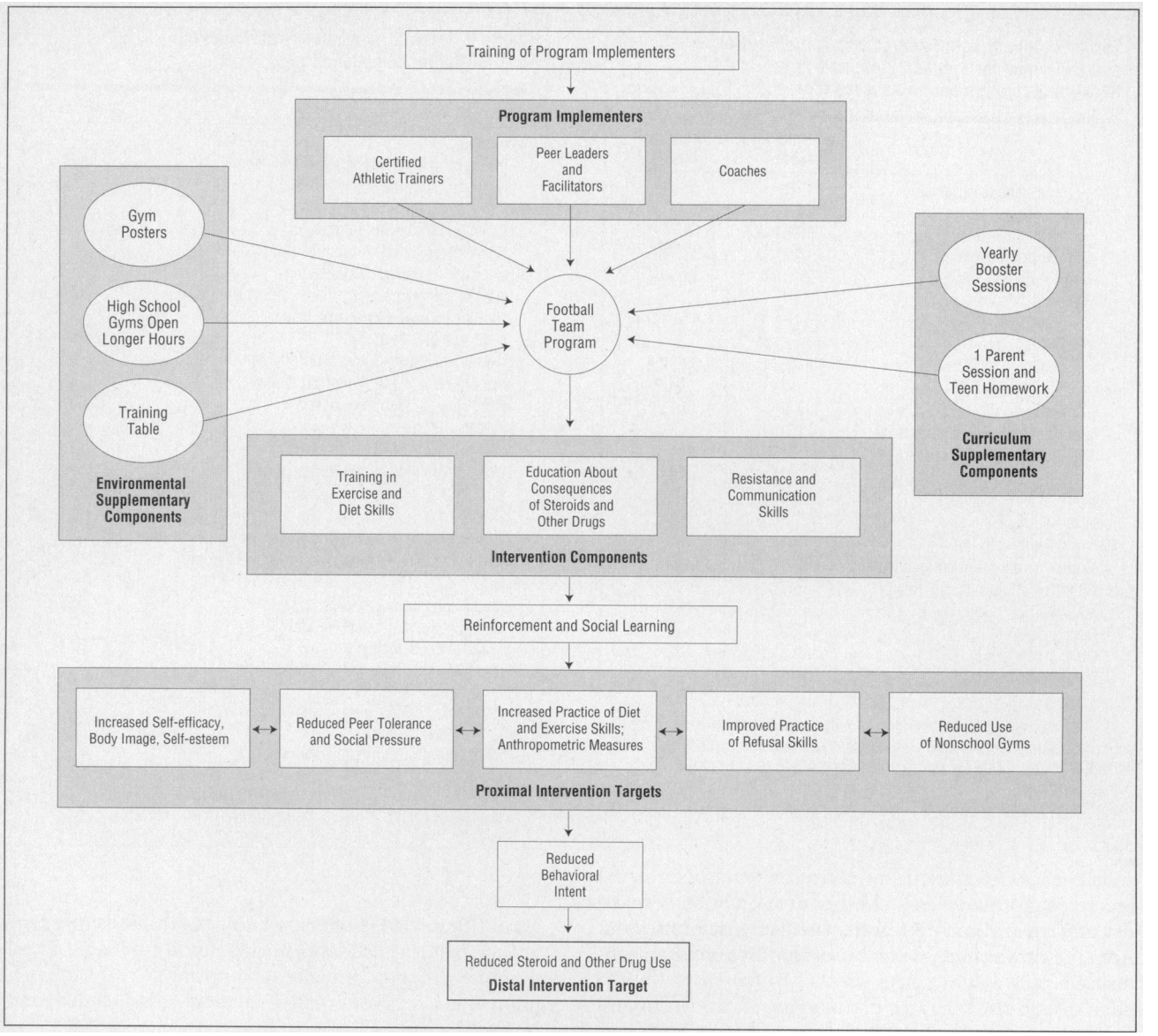

Figure 2. *Model of anabolic androgenic steroid prevention intervention.*

program group was higher at baseline but lower than the control group at the posttest evaluation.

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.

Table 3. Content of the Anabolic Androgenic Steroid Prevention Intervention

Student Nutrition Guide
Nutrients and fluid requirements for exercise
Drugs and supplements glossary
How to read new food labels
What to order at fast food restaurants
Pregame/preworkout and preworkout/postworkout snacks
What to pack for lunch
Recipe makeovers (substituting low-fat for high-fat choices)
Common food guide (energy, fat, grams of protein)

Session	Classroom Session Content
1	Project overview, adolescent testosterone production, side effects of steroid use, normative usage by football players
2	Different types of weight training, sports nutrition
3	Critical look at muscle magazines, including evidence of steroid side effects, truth about supplements, and other ergogenic aids
4	Discriminating low- and high-fat foods, development of an antisteroid advertising campaign, calculating daily protein and energy requirements
5	Importance of breakfast, role play with refusal skills
6	Evaluating the consequences of winning at all costs, effects of other drugs on athletic performance
7	Advertising campaign presentations
8	"Steroid Man" review game

Table 4. Conditional and Unconditional Program Effects

Construct	β* (SE) Unconditional	β* (SE) Conditional
Intentions		
Intent to use steroids	.917 (.477)	.247 (.306)
Intent to use steroids to reach a goal	.750 (.324)†	.470 (.292)‡
Knowledge of steroid alternatives		
Alternatives to steroid use	−.892 (.284)§	−.407 (.235)‖
Knowledge of dietary supplements		
Dietary supplements	−.563 (.275)†	−.527 (.269)‖
Protein powders/ergogenic drugs	.832 (.305)§	.709 (.240)§
Knowledge of steroid and drug effects		
Steroid effects	−.249 (.090)§	−.194 (.037)§
Drug use	.672 (.750)	.673 (.541)
Attitudes		
Win at all costs	.662 (.391)‖	.489 (.326)‡
Drugs will solve all problems	−.991 (.549)‖	−1.163 (.409)§
Body image	−.379 (.180)†	−.448 (.165)§
Norms		
Descriptive norms	−.876 (.536)‡	−.664 (.370)‖
Care what friends think about drugs	−.051 (.261)	−.328 (.248)‡
Beliefs		
Media messages	.836 (.361)†	.696 (.310)†
Negative consequences of steroid use	−.303 (.389)	−.046 (.315)
Positive consequences of steroid use	.970 (.326)§	.648 (.295)†
Parents' attitudes toward steroid use	−.374 (.434)	−.356 (.307)
Peers are an information source	−.554 (.404)‡	−1.11 (.338)§
Skills		
Resistance skills	−.323 (.345)	−.123 (.247)

*Estimate of β in multiple regression model.
†P<.05.
‡P<.20.
§P<.01.
‖P<.10.

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 ap-

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

Constructs	Direction Wanted	P		Pretest		Posttest	
		Unconditional	Conditional	Experimental	Control	Experimental	Control
Intentions							
Intent to use steroids (1 = intent to use, 7 = no intent to use)	↑	...	...	5.713	6.300†	6.032	5.702
Intent to use steroids to reach goal (1 = intent to use, 7 = no intent to use)	↑	<.05	<.20	5.289	5.917†	5.487	5.365
Knowledge of steroid alternatives							
Alternatives to steroid use (1 = know alternatives, 7 = do not know)	↓	<.01	<.10	2.419	1.725‡	1.921	2.075
Knowledge of dietary supplements							
Dietary supplements (1 = good knowledge, 7 = poor knowledge)	↓	<.05	<.10	3.848	3.750	3.129	3.594
Protein powders/ergogenic drugs (1 = good knowledge, 7 = poor knowledge)	↓	<.01	<.01	2.545	2.389	1.879	2.542
Knowledge of steroid and drug effects							
Steroid effects (1 = very correct, 7 = very incorrect)	↓	<.01	<.01	3.124	3.058	2.986	3.171
Drug use (sum score: maximum = 17 points)	↑	...	...	11.125	11.125	11.714	11.042
Attitudes							
Win at all costs (1 = win at all costs, 7 = do not win at all costs)	↑	<.10	<.20	3.851	4.125	3.985	3.597
Drugs will solve all problems (1 = believe medicine will eventually cure all illnesses, 7 = do not believe)	↓	<.10	<.01	4.036	4.250	3.296	4.500
Body image (1 = good body image, 7 = bad body image)	↓	<.05	<.01	2.095	2.292	1.952	2.528
Norms							
Descriptive norms (mean value: of every 100 [athletes, other students, etc], how many do you think use steroids?)	↓	<.20	<.10	4.423	4.214	3.610	4.281
Care what friends think about durgs (1 = care very much, 7 = do not care)	↓	...	<.20	2.304	1.542‡	2.370	1.667
Beliefs							
Media messages (1 = believe in advertisements, 7 = do not believe)	↑	<.05	<.05	4.273	4.479	5.418	4.792
Negative consequences of steroid use (1 = believe steroids cause problems, 7 = do not believe)	↓	...	...	3.009	2.674	3.054	3.104
Positive consequences of steroid use (1 = believe that steroids are not dangerous, 7= believe that steroids are dangerous)	↑	<.01	<.05	5.848	6.375§	6.027	5.583
Parents' attitudes toward steroid use (1 = parents do not promote steroid use, 7 = parents promote steroid use)	↓	...	...	2.714	2.698	2.549	2.906
Peers are an information source (1 = team leaders do not help you learn, 7= team leaders can help you learn)	↓	<.20	<.01	3.524	4.347§	3.054	4.431
Skills							
Resistance skills (1 = know how to turn down drugs, 7 = do not know how to turn down drugs)	↓	...	...	1.868	1.683	1.854	1.992

Constructs are assessed with seven-point Likert scales unless otherwise indicated. Conditional and unconditional significance tests are one tailed; baseline (pretest) significance tests are two tailed.

†P<.10.

‡P<.01.

§P<.05.

plying 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 sug-

gests 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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