

## Effectiveness of Anabolic Steroid Preventative Intervention among Gym Users: Applying Theory of Planned Behavior

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### ABSTRACT

**Background:** Use of anabolic androgenic steroids (AAS) has been associated with adverse physical and psychiatric effects and it is known as rising problem among youth people. This study was conducted to evaluate anabolic steroids preventative intervention efficiency among gym users in Iran and theory of planned behaviour was applied as theoretical framework.

**Methods:** Overall, 120 male gym users participated in this study as intervention and control group. This was a longitudinal randomized pretest - posttest series control group design panel study to implement a behaviour modification based intervention to prevent AAS use. Cross - tabulation and *t*-test by using SPSS statistical package, version 13 was used for the statistical analysis.

**Results:** It was found significant improvements in average response for knowledge about side effects of AAS ( $P<0.001$ ), attitude toward, and intention not to use AAS. Additionally after intervention, the rate of AAS and supplements use was decreased among intervention group.

**Conclusion:** Comprehensive implementation against AAS abuse among gym users and adolescences would be effective to improve adolescents' healthy behaviors and intend them not to use AAS.

**Keywords:** Anabolic steroids; Substance abuse; Theory of planned behavior

### Introduction

Recently anabolic steroids use and abuse was known as one of the high-risk behaviours among youth people. Anabolic-androgenic steroids (AAS) are synthetic substances related to the male sex hormones, which endorse growth of skeletal muscles and the development of male sexual characteristics [1].

Over the last decade a number of studies have examined the prevalence of gym users' use of performance enhancing drugs such as anabolic steroids, clenbuterol

and growth hormones [2] as well as why adolescents use these drugs. AAS are used to improve athletic performance, physical attractiveness, increase body weight, fat-free mass, muscle size, and strength when combined with strength training [3]. Numerous studies have identified risk factors for AAS use, including negative body image, younger age, knowing other AAS users, greater time spent on weight lifting, greater awareness of the effects of AAS use, and other illicit drug use [4-5].

The most common debates against AAS use begin with the arguments on side effects of AAS that threats adolescents. Many of the substances used by athletes and adolescents to enhance performance carry significant critical risks, including a risk of death [6]. Additionally; AAS use has been associated with a wide range of physical and psychiatric complications including atrial fibrillation [7], skin lesions such as severe acne and abscess at site of injection, edema, cardiac palpitations, decreased fertility, and sexual dysfunction [8], changes in lipoprotein fraction, increased triglyceride levels, increased concentrations of several clotting factors, changes in the myocardium such as increased left ventricular mass and dilated cardiomyopathy and hyperinsulinism and diminished glucose tolerance [9]. Psychiatric side effects, such as hypomania, mania, or major depression have also been associated with AASs [10]. In addition to increased aggressiveness, there have also been reports of violent behavior and there are evidences suggesting an enhanced risk of unnatural death by committing suicide or being the victim of homicide [1]. Additionally, AAS have also been linked to the abuse of alcohol, morphine, and other addictive substances [11].

The use of non-prescribed AAS spread among some athletes in the 1950s and consequently extend to adolescents and young adults who train for aesthetic reasons in the early 1980s [12-13] and poly-substance abusers [14-15]. It is estimated that one in five American athletes are using one form or another of AAS [16]. Iran is one of many countries where prevalence of AAS use is increasing, especially among youth people who desire to have muscular body by physical training. Recent studies among large samples of youth who were training as gym users and body builders in Iran reported that approximately 13% of gym population [17] and 18.8 % [18] had ever used AAS. Kashi et al [19] reported that 63.3% of ath-

letes in Iran at least have used ASS one time in their life. In addition, study of Kargarfard et al [20] on university students in Isfahan showed that 8.3 % had used ASS in their long life.

The worldwide magnitude of AAS use as well as Iran indicate necessity of designing comprehensive and effective interventions to prevent AASs use and abuse among athletes and more especially among adolescents and youth population who exercise in the gym salons. In the field of drug abuse prevention research, it would be useful to know how cognitive related factors like knowledge, social norms, or beliefs are responsible to predict intention and consequently behavior [21]. In addition to sufficient information, certain psychosocial factors, such as attitude, subjective norm, and perceived behavioral control, seem to be significant factors in determining the probability of adopting or rejecting a healthy behavior. In this regard, the theories of planned behavior in numerous studies as a research theoretical framework were applied; and several studies have reported TPB variables' predictability to explain anabolic steroid use among athletes [22-24]. This theory postulates that behavioral intention, which is the immediate predictor of AAS use, correlate to attitudes/beliefs regarding AAS use and its users, subjective norms about AAS use among peers, and perceived behavioral control to abstain AAS use [21]. (Fig. 1.)

In spite of the increased prevalence of AAS use in Iran, no theoretically based preventative program against AAS use among Iranian adolescents was found in the literature. Based on the abovementioned background, the objective of this study was designing and implementing a peer based educational intervention to increase awareness about side effects of AAS components and consequently prevent and reduce anabolic-steroid use among male gym users based on theory of planned behavior.

## **Materials and Methods**

### ***Participants***

This study was conducted among young male gym users in Hamadan city during 2008–2009. Two body building club randomly selected within all male bodybuilding clubs in Hamadan, Iran. Of the 260 gym users enrolled at the two bodybuilding clubs, 120 (46.15%) male participated in this study. Sixty participants as intervention and 60 as control groups were enrolled at the baseline survey, of who all were followed up after 2-month intervention. This study was conducted with approval from Hamadan University of Medical sciences' institutional review board. Informed assent and consent were obtained from participants.

### ***Measures***

Prior to conducting the main project, a pilot study was carried out. Initially the relevant questionnaires were administered to 30 body builders who were similar to participants in the main study to obtain feedback about the clarity, length comprehensiveness, time of completion, and internal reliability of the measures. Moreover, participants were instructed about how to fill questioners before gathering information.

### ***Demographics***

Background data collected in this research include: age, literacy (elementary; secondary; high school; and university), marital status (single; married), having coach who use AAS (yes/no), having friends who had history of AAS use (yes/no), duration of exercises in gym saloon (per months), history of smoking (yes/no), alcohol (yes/no). In addition, the participants were asked to describe motivation to use AAS, including (to grow stronger", "to perform better in athletics", "to get a muscular body", "to be attractiveness by others").

### ***AAS Use***

The AAS Survey consisted of four questions that addressed the specific compounds used, history of AAS use, and sport supplement use (yes/no), and type of used supplement.

### ***TPB Theoretical Variables***

The items which assessed components of the TPB were modified from scales of AAS related attitudes and intention to use Housman [23]; Bering [24] for AAS use and 18 items were composed under four major constructs, 1) attitude positive toward AAS; 2) subjective norms about AAS; 3) perceived behavioral control; 4) behavioral intention to AAS use. Six items were designed to measure attitude toward use of AAS (e.g., "If I were to use anabolic steroid it would help me to improve sports performance"). Four items were designed to measure subjective norms toward use of AAS (e.g., "If I use of anabolic steroid my coach it will confirm"). Four items were designed to perceived behavioral control not to use of AAS (e.g., "I believe that I can manage myself against pressure to use of anabolic steroid"). Four items were designed to evaluate behavior intention to AAS use (e.g., "I intend to use anabolic steroid to improve my physical performance in the next 6 months"). In order to facilitate respondents' responses to the items, all items were standardized to a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Estimated reliability coefficients for each TPB constructs questionnaire were as follows: attitude ( $\alpha = 0.82$ ); subjective norms ( $\alpha = 0.78$ ); perceived behavior control ( $\alpha = 0.73$ ) and behavioral intention ( $\alpha = 0.92$ ). These results demonstrated that questionnaires were internally consistent.

### ***Knowledge about side effects of AASs***

Gym users' awareness about the AASs' side effects was measured by an 18 items scale. Example of items included:

1. AASs increase probability of aggressiveness; and
2. Infertility is one of the side effects of AASs use.

### **Procedure**

This was a longitudinal randomized pretest - posttest series control group design panel study to implement a health education based intervention to prevent and reduce AAS use among a sample of young male gym users recruited from two randomly selected body building club in Hamadan, Iran. After obtaining informed consent participants were enrolled in the study, a 50-item, structured questionnaire with the aforementioned measures was distributed to the athletes to complete. Prior to the self-administration of the questionnaire, study staff explained the logistics of answering different type of questions and clarified any concerns and questions that were raised by participants.

The intervention aimed to provide participants with refusal skills against AAS use. The intervention activates were tailored and implemented based on athletes educational needs, proper nutrition, and training resistance using group discussion, printed leaflet, and audio-visual CD. Additionally, the program also aimed increase participants knowledge with a focus on side effects of AAS abuse. For achieving effective preventative program, the six 1 hour-session was conducted based on health educational programs at the gym salons. Furthermore, prior to intervention four participants who were commitment to mediate AAS prevention program's message to gym users in the intervention group, were selected as the mediator; any of them had experience in body building clubs for 4 to 11 years. Consequently, four subgroups were formed as intervention group that were coordinated by one responsible mediator.

### **Statistical Analysis**

Analyses were conducted by using SPSS-13 and a probability level of 0.05 was used throughout. Cross-tabulation and *t*-test were employed to determine comparability of the intervention in compare with control group.

### **Results**

The participants' ages ranged from 15 to 43 years, with the mean (SD) age of all participants being 23.68( $\pm$ SD:4.46) years. Of the 26.7% of participants were younger than 20 and 5.8% older than 31 years. Vast majority of participants (44.2%) were 21-25 years, and those 26-30 years (23.3%). Of all respondents, 4.2% reported using of testosterone (4.2%). Consequently, anadrol (3.3%), dianabol (1.7%), durabolin (0.8%) and oxandrolone (3.3%), methyl testosterone (3.3%), nandrolone (1.7%) were the next AAS components. Concerning average length of gym practice among participants it was ranged 11- 120 months with the mean 27.15 ( $\pm$ SD:2.21).

At baseline, 20% of gym users reported that they had used AAS components. Participants also reported that 53.3% of their friends had used AAS and about 48.3% of them reported that their coach have used AAS. Additionally Table 1 shows frequency of AAS use among participants for age, overweight, duration of gym practice, AAS use among gym users, their friends, their coach, history of alcohol use, history of smoking and use of supplements in the both intervention and control groups. Cross-tabulation analysis revealed that there were not significant differences between two Intervention and control groups before implementation of AAS prevention educational program ( $X^2:0.653$ , d.f:1.p:684). These results revealed homogeneity of participants.

Table 2 indicates that there are significant improvements in average response

for independent variables among gym users who were under intervention. As it shown in table average response for positive attitude AAS was 18.25 that it was decreased to increased to 14.36 after intervention. The same results was found for knowledge about side effects of AAS and average response was improved from 6.83 to 11.38 after implementing educational program. Additionally average response to intention to AAS use was 8.38 that it was decreased to 6.75 after intervention. However, it was not found significant improvement for score of subjective norms

about AAS and Perceived behavioral control.

To assess efficiency of AAS preventative program cross-tabulation analysis was performed. Despite the results did not show significant relation between efficiency AAS preventative educational intervention, it was found improvement in gym users' behavior not to use AAS in the past 2 months AS it shown in Table 3 the percent of AAS use in the intervention group was 18.3% that it was decreased to 10% after intervention. Additionally, Tables 3 show supplement use before and after training in two groups.

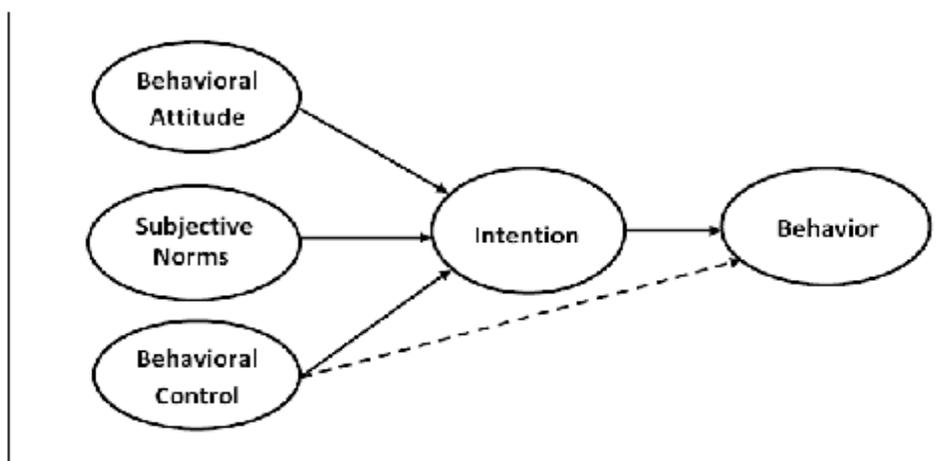


Fig. 1: Theory of Planned Behavior

Table 1: Pretest Equivalency results for Intervention (n=60) and Control groups (n=60)

Variables	Intervention Group	Control Grou	P-value
	<b>Mean (±SD)</b>	<b>Mean (±SD)</b>	
Age	24.35 (5.46)	23.01 (3.08)	0.102
Length of gym practice (Months)	25.85 (24.00)	28.45 (20.22)	0.522
Overweight (kg)	77.63 (13.19)	81.90 (15.50)	0.107
	<b>n (%)</b>	<b>n (%)</b>	
Previous history of AASs use	19 (31.66)	26 (43.33)	0.187
Current AAS use	11 (18.33)	13 (21.66)	0.648
Having AAS user coach	24 (40)	34 (56.66)	0.068
Having AAS user friends	31 (51.66)	33 (55)	0.714
History of alcohol use	12 (20)	18 (30)	0.206
History of Smoking	8 (13.33)	10 (16.66)	0.609
Consumption of supplements	44 (73.33)	50 (83.33)	0.184

**Table 2:** Average Responses for TPB variables and Knowledge about side effects of AAS Before and After Educational Program

<b>Independent Variables</b>	<b>Before Intervention Mean (±SD)</b>	<b>After Intervention Mean (±SD)</b>	<b>P-value</b>
<b>Knowledge</b>			
Intervention group	6.83 (4.55)	11.38 (2.88)	0.000
Control group	7.08 (3.98)	7.93 (3.27)	0.045
<b>Attitude</b>			
Intervention group	18.35 (5.02)	14.26 (5.06)	0.000
Control group	18.50 (5.62)	17.61 (3.84)	0.014
<b>Behavioral intention</b>			
Intervention group	8.38 (3.92)	6.75 (3.25)	0.000
Control group	9.06 (4.05)	8.96 (4.16)	0.600
<b>Perceived behavior control</b>			
Intervention group	15.08 (3.84)	15.90 (2.72)	0.005
Control group	14.53 (3.31)	14.66 (3.77)	0.398
<b>Subjective norms</b>			
Intervention group	10.61 (3.85)	10.10 (3.42)	0.082
Control group	11.11 (3.86)	11.56 (3.67)	0.088
<b>Intention AAS use</b>			
Intervention group	8.83 (3.95)	6.75(3.25)	0.000
Control group	9.06 (4.05)	8.96 (4.16)	

Intervention group (n=60), Control group (n=60)

**Table 3:** Anabolic Steroid Abuse and Supplement use before and after training in two groups

<b>Variables</b>	<b>Before Intervention n (%)</b>	<b>After Intervention n (%)</b>	<b>X2</b>	<b>P-value</b>
<b>AAS use</b>				
Intervention group	11 (18.33)	6 (10)	1.713	0.191
Control group	13 (21.66)	11 (18.33)	0.283	0.648
<b>Supplement use</b>				
Intervention group	44 (73.33)	41 (68.33)	5.783	0.016
Control group	50 (83.33)	52 (86.66)	1.768	0.184

Intervention group (n=60), Control group (n=60)

## Discussion

The aim of this study was to assess the effectiveness of an anabolic steroid abuse prevention program based on im-

proving gym practices without using AAS components. The theory of planned behavior was conducted as theoretical

framework to assess educational need assessment among male participants. Even though the duration of the educational intervention in this study was short, it was found significant improvements after manipulation. Analysis of the baseline and 2-months follow-up clearly demonstrated significant intervention effects on the participants' attitude, Intention as well as their knowledge about side effects of anabolic steroid among intervention group.

Although there are many factors that affect on human behavior our findings indicated that improving knowledge about side effects of AAS had effective role to reduce rate of AAS use among intervention group. Allahverdipour et al declared that knowledge about side effects of drugs and improving resistance skills can protect adolescents against drug abuse [25]. Additionally, along knowledge, changing beliefs about AAS components and knowing what kinds of beliefs might be effective factor to implementing AAS prevention program would be important to promote healthy behaviors. Our findings showed that the applied AAS prevention program had significant effect to modify participants' beliefs against AAS components and AAS use. Despite theoretical framework of TPB, which attitude, subjective norms and perceived behavioral control affect on behavioral intention, our findings showed that education program could not improve average response for participants' subjective norms against AAS and their perceived behavioral control. While, participants average response for behavioral intention not to use AAS components significantly increased after intervention. It seems more study are needed about predictability of subjective norms and perceived behavioral control on behavioral intention in different cultures and populations.

Concerning efficiency of intervention, in spite of decreasing the rate of AAS use after intervention it was not found significant differences between intervention

and control groups and these outcomes is not consistent with similar studies [26-29]. Non significant reduction in AAS use after intervention between both intervention and control groups could be because of low sample size, limitation of resource to design comprehensive educational program, and peer pressure to continue AAS use.

Nilsson et al indicated that designing strategy to reduce the use of ASS among youth is a difficult issue [28] and even some studies have shown that the misuse of AAS increased after educational programs [30, 31]. Evidences from other researches confirm our findings about applying health education programs to prevent AAS use among adolescents and gym users [26-29]. In consistent to objectives of this study, numerous studies [32, 33] reported that low awareness and inappropriate beliefs are important reasons for using substances.

## **Conclusion**

Overall, findings of the current study supported that implementing AAS abuse preventative program among gym users and adolescences would be effective to improve resistance skills not to use AAS. Although the present study has several strengths, such as theory driven, interventional study, psychometrically sound measures and high response rate of the study participants, the study are limited due to the homogenous sample and self-reported questionnaires (there is a possibility of misreporting). Future studies in this context may also support our findings by sampling female gym users and diverse population.

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