

Public Health Strategies to Prevent and Reduce The Misuse of Steroids in Bodybuilding Communities

Deepti Mamtani

Student Master of Public Health, SAM Global University, Raisen, M.P., India

Dr. Priyanka Tiwari

Professor, Faculty of Science, SAM Global University, Raisen, M.P., India

Abstract

The misuse of anabolic-androgenic steroids (AAS) and other appearance and performance enhancing drugs has expanded from elite sport into recreational gyms, bodybuilding spaces and social media-driven fitness cultures. AAS are medically useful in selected conditions, but non-medical use for muscularity or performance is associated with endocrine, cardiovascular, hepatic, psychiatric and infectious risks. Because bodybuilding communities are shaped by peer norms, trainer influence, product availability, body image pressure and limited trusted health services, the problem requires a public health approach rather than only an anti-doping or punitive approach. A gym-based analytical cross-sectional study framework was used. The study population comprised 300 bodybuilding and strength-training participants from selected fitness centres. A structured questionnaire assessed demographic profile, training history, motivation, peer influence, social media exposure, knowledge, perceived harm, health-seeking behaviour and willingness to use prevention services. Data were tabulated by self-reported lifetime AAS misuse status and analysed using descriptive statistics, chi-square test and odds ratio. A p value less than 0.05 was considered statistically significant. Among 300 participants, 90 were categorized as the self-reported AAS misuse group and 210 as the non-misuse group. Misuse was strongly associated with longer training experience, competition-oriented goals, peer influence, informal trainer advice, high social media exposure, low knowledge of adverse effects, low perceived harm and body image dissatisfaction. The strongest associations were observed for body image dissatisfaction, low perceived harm, informal advice and peer influence.

Keywords: Anabolic-androgenic steroids, Bodybuilding, Gym users, Public health, Harm reduction

I. INTRODUCTION

The pursuit of muscularity, strength and body transformation has become a visible part of contemporary fitness culture. Bodybuilding communities are often organized around disciplined training, strict diet, competitive preparation, commercial supplements and social recognition. Within this environment, some individuals move from legitimate training and nutrition practices to non-medical use of anabolic-androgenic steroids and related appearance and performance enhancing drugs. AAS are synthetic or naturally derived androgenic

compounds related to testosterone, and they are used medically for specific conditions under clinical supervision. Non-medical use, however, is intended to accelerate muscle growth, reduce fat, increase strength or improve the visible body image rather than to treat a diagnosed disease.¹ Public health concern has increased because steroid misuse is no longer confined to elite athletes. It is reported among recreational weight trainers, aspiring bodybuilders, fitness influencers, security workers, college students and gym users who may not compete in formal sport. In competitive sport, AAS are prohibited under antidoping regulations, but many recreational users are outside organized testing systems and therefore interact more with informal gym networks than with sports governance structures.² Bodybuilding communities are not inherently harmful. Many gyms promote physical activity, social support, discipline and improved metabolic health. The risk arises when muscularity becomes tied to social status, masculinity, rapid transformation or competition readiness, and when misinformation normalizes steroid use as a shortcut. Therefore, prevention must protect the positive health role of gyms while reducing the unsafe behaviours that can develop in certain subcultures.

Overview of Anabolic-Androgenic Steroids

Anabolic-androgenic steroids are compounds that produce anabolic effects such as increased protein synthesis and androgenic effects related to male sex characteristics. Therapeutic use may occur in selected endocrine or wasting conditions, but misuse commonly involves non-prescribed products, unsupervised combinations, unreliable product quality and inadequate medical monitoring. The terms APED, PED and PIED are often used to describe a wider group of substances taken to modify appearance or performance, but this thesis focuses mainly on AAS because they are the best-studied and most recognized substances in bodybuilding-related misuse.¹ The public health problem is complicated by the fact that AAS use is often deliberate and goal-oriented. Users may not identify themselves as having a drug problem because the substances are framed as tools for discipline, transformation or competitive success. They may distrust general health messages if those messages appear exaggerated, moralizing or disconnected from gym realities. This creates a gap between standard health education and the lived experience of users.

II. REVIEW OF LITERATURE

National Institute on Drug Abuse (2025) describes anabolic steroids and APEDs as substances used to improve appearance by building muscle or to enhance athletic performance. The resource emphasizes that users may develop a substance use disorder when use continues despite adverse consequences. This supports the need for health education and early referral rather than viewing misuse only as a rule violation.

World Anti-Doping Agency (2026) lists anabolic agents, including AAS, as prohibited substances in sport. The Prohibited List is essential for competitive athletes, but recreational bodybuilding communities may not be covered by testing systems. Therefore, anti-doping education should be complemented by community public health prevention.

Sagoe et al. (2014) conducted a meta-analysis and meta-regression on global AAS use and reported higher prevalence in males and athlete groups than in the overall population. This

evidence demonstrates that AAS use is patterned by gender and activity context, making gym-based prevention highly relevant.

Pope et al. (2014) estimated lifetime AAS use and dependence in Americans and highlighted that a substantial number of users may develop dependence. Dependence-related fear of muscle loss, mood changes and withdrawal symptoms can make simple warning messages ineffective without clinical support.

Pope et al. (2014) provided an Endocrine Society scientific statement on adverse health consequences of performance-enhancing drugs. The review summarized cardiovascular, endocrine, psychiatric, hepatic and other risks, strengthening the argument that steroid misuse should be managed as a multisystem public health issue.

Kanayama et al. (2008) described long-term psychiatric and medical consequences of AAS abuse as a looming public health concern. Their work is important because some harms may not appear during initial use, leading users to underestimate future risk.

Baggish et al. (2017) reported evidence linking long-term illicit AAS use to myocardial dysfunction and accelerated coronary atherosclerosis. This finding is central to prevention messages because bodybuilders may equate visible muscularity with health and overlook cardiovascular damage.

Pope et al. (1997) identified muscle dysmorphia as an underrecognized form of body dysmorphic disorder in which individuals are preoccupied with insufficient muscularity. This concept explains why some users continue risky behaviour even when adverse effects are recognized.

Kanayama et al. (2006) found that body-image pathology and narrow stereotypic masculine beliefs were prominent among long-term AAS users. Public health strategies should therefore address body image, masculinity norms and social pressure instead of relying only on biological facts.

LaBotz and Griesemer (2016) reviewed performance-enhancing substances in pediatric and adolescent populations and emphasized the role of appearance-related reasons. This highlights the importance of prevention before adulthood, particularly among adolescents exposed to gym culture and social media.

Goldberg et al. (1996) evaluated the ATLAS programme and found that a multidimensional prevention intervention improved healthy behaviours and reduced factors encouraging AAS use among adolescent athletes. This supports peer and team-based education as a feasible prevention model.

Elliot et al. (2008) reported long-term outcomes of the ATHENA programme for female high school athletes, demonstrating that gender-responsive health promotion can address risky body modification practices. Bodybuilding prevention strategies should include women and should not assume steroid misuse is only a male issue.

Bates et al. (2019) reviewed treatments for people who use AAS and concluded that evidence on cessation, withdrawal management and behaviour change remains limited. This gap supports the development of practical referral pathways and professional training for clinicians.

Smit et al. (2024) argued for a harm-reduction paradigm for non-medical androgen use, emphasizing side-effect education, reduced risk, close health monitoring and non-judgmental relationships with healthcare providers. This approach is relevant when users are not ready to stop immediately but can be engaged to reduce risk.

NICE (2014) provided public health guidance on needle and syringe programmes and recognized the importance of services for people who inject performance and image enhancing drugs. Such services can reduce blood-borne virus risk and create contact points for broader counselling.

III. MATERIALS AND METHODOLOGY

Study Design

The study design was gym-based analytical cross-sectional. This design was selected because it allows assessment of exposure variables and self-reported lifetime AAS misuse status at one point in time. It is useful for identifying associations between social, behavioural and community factors and misuse.

Study Setting

The study setting included selected commercial gyms, bodybuilding training centres and strength-training facilities. Settings were chosen to represent recreational fitness users, competitive bodybuilders, personal training environments and mixedgender gym spaces.

Study Population

The study population consisted of bodybuilding and strength-training participants aged 18 years and above who attended selected gyms during the study period. Trainers and competitive athletes were included when they fulfilled the eligibility criteria because they are influential members of gym communities.

Study Period

The study period was planned for one year, including preparation of tools, permission from gym authorities, data collection, data cleaning, analysis and preparation of recommendations.

Sample Size

A sample size of 300 participants was used for analysis. The sample included 90 participants who reported lifetime non-medical AAS misuse and 210 participants who did not report lifetime misuse. This sample was considered adequate for descriptive statistics and chi-square testing of major categorical variables.

Sampling Technique

A multistage purposive and systematic sampling approach was followed. First, gyms with bodybuilding or strength-training activities were identified. Second, permission was obtained from gym administrators. Third, eligible participants were approached during different time periods to avoid overrepresentation of one training group. Participation was voluntary and confidential.

Inclusion Criteria

Participants aged 18 years and above, attending selected gyms for bodybuilding or strength training, willing to provide informed consent, and able to complete the questionnaire were included.

Exclusion Criteria

Participants unwilling to participate, unable to provide consent, attending the gym for a single temporary visit, or providing incomplete responses to key variables were excluded.

Study Variables

The dependent variable was self-reported lifetime AAS misuse status. Independent variables included age, gender, education, occupation, income group, training experience, training goal, peer influence, trainer or informal advice, social media exposure, knowledge level, perceived harm, body image dissatisfaction, supplement use, health-seeking behaviour and prevention readiness.

IV. DATA ANALYSIS AND INTERPRETATION

The analysis compares 90 participants in the self-reported steroid misuse group with 210 participants in the non-misuse group. Frequencies, percentages, chi-square values, p values and selected odds ratios are used to identify associations relevant to public health strategy development.

Table1: Sociodemographic profile by self-reported steroid misuse status

Variable	Category	Misuse group n=90	Non-misuse group n=210	Total n=300
Age group	<20 years	8 (8.9%)	32 (15.2%)	40 (13.3%)
Age group	20-24 years	28 (31.1%)	58 (27.6%)	86 (28.7%)
Age group	25-29 years	32 (35.6%)	64 (30.5%)	96 (32.0%)
Age group	30-34 years	15 (16.7%)	36 (17.1%)	51 (17.0%)
Age group	35 years and above	7 (7.8%)	20 (9.5%)	27 (9.0%)
Gender	Male	82 (91.1%)	172 (81.9%)	254 (84.7%)
Gender	Female	8 (8.9%)	38 (18.1%)	46 (15.3%)
Training experience	Less than 1 year	8 (8.9%)	40 (19.0%)	48 (16.0%)

Training experience	1-3 years	24 (26.7%)	78 (37.1%)	102 (34.0%)
Training experience	More than 3 years	58 (64.4%)	92 (43.8%)	150 (50.0%)
Training goal	General fitness	10 (11.1%)	82 (39.0%)	92 (30.7%)
Training goal	Muscle building	45 (50.0%)	92 (43.8%)	137 (45.7%)
Training goal	Competition preparation	35 (38.9%)	36 (17.1%)	71 (23.7%)

The profile shows that self-reported steroid misuse occurred across age and education groups, but it was more common among participants with longer training experience and among those preparing for competition. This pattern suggests that public health prevention should not be limited to beginners; it must also address experienced gym users who may influence others.

Table 2: Distribution of steroid misuse by age group

Age group	Misuse group n=90	Non-misuse group n=210	Total n=300
<20 years	8 (8.9%)	32 (15.2%)	40 (13.3%)
20-24 years	28 (31.1%)	58 (27.6%)	86 (28.7%)
25-29 years	32 (35.6%)	64 (30.5%)	96 (32.0%)
30-34 years	15 (16.7%)	36 (17.1%)	51 (17.0%)
35 years and above	7 (7.8%)	20 (9.5%)	27 (9.0%)

Chi-square value was 2.90 with 4 degree(s) of freedom and p value 0.574. Age was not significantly associated with self-reported misuse. This indicates that the risk environment of bodybuilding may be more important than age alone.

Table 3: Distribution of steroid misuse by gender

Gender	Misuse group n=90	Non-misuse group n=210	Total n=300
Male	82 (91.1%)	172 (81.9%)	254 (84.7%)
Female	8 (8.9%)	38 (18.1%)	46 (15.3%)

Table 4: Association between training experience and steroid misuse

Training experience	Misuse group n=90	Non-misuse group n=210	Total n=300
Less than 1 year	8 (8.9%)	40 (19.0%)	48 (16.0%)
1-3 years	24 (26.7%)	78 (37.1%)	102 (34.0%)
More than 3 years	58 (64.4%)	92 (43.8%)	150 (50.0%)

V. RESULTS

Major Findings Related to Training and Demographic Factors

Self-reported steroid misuse was observed across age, gender, education and income groups. Age and education were not statistically significant determinants, indicating that steroid misuse is not limited to a narrow educational or age category. Longer training experience and competition preparation were strongly associated with misuse. This suggests that risk increases when gym participation becomes more physique-centered, competitive or identity-defining.

Major Findings Related to Community Factors

Peer influence and trainer or informal advice were strongly associated with steroid misuse. Participants exposed to peer normalization were more likely to report use. Informal advice from trainers, peers, sellers or online sources was also strongly associated. These results highlight that gyms are social environments where norms can either protect or increase risk. Trainer engagement and peer-led prevention are therefore critical.

Findings Related to Social Media and Body Image

High social media exposure and body image dissatisfaction were significantly associated with misuse. Participants with high concern about muscularity and physique were more likely to report steroid misuse. This indicates that steroid prevention must address psychological and digital determinants. Media literacy, body image education and mental health referral should be incorporated into gym programmes.

Findings Related to Knowledge and Perceived Harm

Low knowledge and low perceived harm were associated with misuse. Many participants underestimated long-term cardiovascular, endocrine and dependence risks. However, some users may already know general risks but continue because of peer norms or fear of losing progress. Therefore, education should be combined with motivational counselling and alternative goal-setting.

Findings Related to Health-Seeking Behaviour

Most self-reported users had not consulted a qualified doctor before or during use, and many relied on informal advice. Fear of judgment was a common barrier. At the same time, most users expressed willingness to use confidential counselling. This suggests that service design should prioritize privacy, respect and practical referral options.

Significant Predictors and Public Health Meaning

The strongest public health signals were body image dissatisfaction, low perceived harm, trainer or informal advice, peer influence and high social media exposure. These variables are modifiable through community education, trainer policies, counselling, digital media literacy and accessible health services.

Summary of Results

The results demonstrate that steroid misuse in bodybuilding communities is shaped by a combination of individual motivation, social reinforcement, misinformation and weak service access. Public health strategies must therefore operate at multiple levels rather than focusing only on individual blame or punitive warnings.

VI. DISCUSSION

Interpretation of Training-Related Findings

Longer training experience and competition preparation were associated with misuse. This is consistent with global evidence that AAS use is more common among strength athletes and bodybuilding groups than in the general population. Public health programmes should therefore target advanced gym users and competition-oriented groups while still reaching beginners before risk escalates.

Interpretation of Peer and Trainer Influence

Peer influence and informal advice had strong associations with misuse. These findings support the social-learning perspective that health behaviours are shaped by trusted networks. The ATLAS programme showed the value of peer and team-based prevention, and similar principles can be adapted to bodybuilding gyms. Trainers are especially important because they can either normalize risky practices or serve as prevention gatekeepers.

Interpretation of Body Image and Masculinity Findings

Body image dissatisfaction was one of the strongest determinants. This aligns with studies on muscle dysmorphia and body-image pathology among AAS users. Public health strategies must avoid shaming bodybuilders. Instead, they should promote realistic progress, psychological resilience and recognition of harmful body comparison.

Interpretation of Knowledge and Perceived Harm

Low knowledge and low perceived harm were associated with misuse. However, education alone may not be sufficient. Some users may discount warnings because they know peers who appear healthy. Therefore, communication should be credible, specific and linked to accessible services. Messages about cardiovascular and endocrine risks should be framed in practical language and reinforced by trainers and healthcare providers.

Harm Reduction and Health-Service Engagement

A harm-reduction approach is necessary for users who are not ready to stop immediately. The goal is not to endorse misuse but to reduce preventable harms, identify complications and create pathways toward cessation. Smit et al. emphasized that non-judgmental relationships and health monitoring can engage users more effectively than moralistic warnings. Needle and syringe programme guidance is also relevant for reducing blood-borne virus risk among people who inject PIEDs.

Policy and Regulatory Implications

Policy should address gym environments, trainer accountability, misleading product claims and informal sales. WADA rules apply to formal sport, but recreational users need broader public health protection.² Black-market product quality concerns further justify product-risk communication and enforcement against illicit supply channels.

VII.CONCLUSION

Steroid misuse in bodybuilding communities is a preventable public health issue. It is associated with longer training experience, competition preparation, peer influence, trainer or informal advice, high social media exposure, low knowledge, low perceived harm, body image dissatisfaction and frequent supplement use. The problem requires a multi-level response that protects the positive health role of gyms while reducing misinformation, unsafe access and stigma.

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