

VIEWPOINT

Body Image Disorders and Abuse of Anabolic-Androgenic Steroids Among Men

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During the last several decades, the image of the idealized male body in many countries has shifted toward a substantially higher level of muscularity. Bodybuilding competitors, male models, and even children's action toys (eg, "G.I. Joe") have become significantly more muscular than their predecessors of the 1960s. Nowadays, young men are constantly exposed to muscular male images on magazine covers, in advertisements, on television, and in movies.

Perhaps as a consequence of these trends, young men have become increasingly concerned with their muscularity, reflected by an increasing prevalence of "muscle dysmorphia," a form of body image disorder characterized by an obsessive preoccupation with a muscular appearance.^{1,2} First described in the scientific literature less than 25 years ago, muscle dysmorphia has now become the subject of numerous reports and has been included as an official diagnosis in the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5)*.²

Approximately 2.2% of US men have been reported to have body dysmorphic disorder, and among these men with body dysmorphic disorder, 9% to 25% have muscle dysmorphia, which would suggest the

years.⁴ Prior to the 1980s, AAS use was largely restricted to elite athletes. With the publication of popular books on how to use these drugs, starting in the 1980s, AAS use began to spread from the athletic world to the general population. Today, most AAS users are not competitive athletes but rather nonathlete weightlifters who use AASs largely to look leaner and more muscular. Within this increasing new population of AAS users, even the oldest members—those who first initiated AAS use as youths in the 1980s—are only now entering middle age and beginning to experience the combined effects of long-term AAS abuse and aging.

In their attempts to gain muscle and lose body fat, AAS users often combine highly supraphysiologic doses of AASs with other appearance- and performance-enhancing substances, such as human growth hormone, thyroid hormones, insulin, clenbuterol, and other potentially toxic substances.⁴ Users of AASs often display additional high-risk behaviors such as the ingestion of drugs of abuse (such as cocaine and opioids), unsafe sexual behaviors, and unsafe injection practices.^{5,6} Furthermore, a large population of individuals do not intentionally use illicit AASs but do use substantial amounts of over-the-counter herbal or dietary supplements purported to enhance performance and appearance. The sale of such supplements is largely unregulated, and many products have been found to contain illegal AASs, other anabolic compounds (eg, selective androgen receptor modulators), and even toxic contaminants with no anabolic properties at all.⁷ These supplements may therefore pose potential

health problems for individuals who use these products, including large numbers of men and women in the US Armed Forces, whose consumption of such supplements is increasing and who may be unknowingly exposed to AASs and other potent drugs.⁷

Emerging evidence has implicated several adverse health effects of AAS use, including increased risk of premature death, cardiovascular disorders, psychiatric effects, prolonged suppression of the hypothalamic-pituitary-testicular axis, and possible long-term neurotoxic effects.^{4,8} Long-term exposure to supraphysiologic doses of AASs has been linked to myocardial dysfunction and stroke, clinically serious cardiomyopathy, and acceleration of atherosclerotic disease in young individuals known or believed to have used AASs.^{4,8,9} Also, during AAS exposure, users may develop manic or hypomanic symptoms, sometimes associated with aggression, violence, and even homicide.

Users of AASs may develop protracted hypogonadism following AAS withdrawal, which may sometimes

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possibility that hundreds of thousands of US men may have this syndrome.² Men with muscle dysmorphia describe dissatisfaction with their body size and shape and are preoccupied with the idea that their body is insufficiently muscular; these men show elevated rates of mood and anxiety disorders, obsessive and compulsive behaviors, substance abuse, and impairment of social and occupational functioning.^{1,3} Most men with muscle dysmorphia engage in weightlifting, many of them use dietary supplements, and in 2 studies, 10 of 23 men (44%)¹ and 11 of 24 men (46%)³ with muscle dysmorphia reported lifetime use of anabolic-androgenic steroids (AASs)—the family of drugs that includes testosterone and its many synthetic derivatives.

A recent analysis estimated that 2.9 million to 4.0 million individuals in the United States, nearly all of whom are male, have used AASs at some time in their lives; this analysis estimated that about 1 million men in the United States have experienced AAS dependence, wherein they continued to use AASs at high doses for

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persist for years.¹⁰ During AAS withdrawal, hypogonadism may cause some users to develop major depression, leading in some cases to suicidality. Few clinicians are familiar with treating AAS-induced hypogonadism, and clinicians often take an approach of simply advising users to stop these drugs. However, in an attempt to self-treat the highly distressing symptoms of AAS-withdrawal hypogonadism, users frequently resume AAS use, leading to a vicious cycle of dependence.

Supraphysiologic levels of AASs produce apoptotic effects on human neuronal cells, raising the possibility of early-onset dementia in individuals with prolonged high-dose AAS exposure. Additionally, AAS users experience an increased prevalence of nephrotoxic effects; musculoskeletal injuries, especially tendon ruptures; liver toxic effects; and needle-borne infections, such as human immunodeficiency virus and hepatitis C. A recent Endocrine Society Scientific Statement provides references to the growing literature documenting these various effects.⁴

The long-term health consequences of AAS abuse, and knowledge of effective strategies to prevent or treat this disorder, remain limited. The lack of studies is partially attributable to the covert nature of AAS use and abuse, which has prevented this problem from receiving the attention of policy makers and funding agencies, who may view AASs simply as a problem of illegal use of these substances in sports. The topic has received little coverage

in medical textbooks and, until recently, limited attention in the overall medical literature. Thus, many clinicians may be unaware of AAS abuse by nonathlete weightlifters and may be unprepared to treat patients presenting with AAS withdrawal or with other AAS-induced complications.

Several steps are needed to address the health problems associated with AAS use. Long-term observational studies are essential to determine the prevalence, patterns of abuse, and health risks associated with AAS use. Because clinical trials cannot ethically duplicate the large doses of AASs (often combined with other appearance- and performance-enhancing drugs) used by nonathlete weightlifters, prospective observational studies likely represent the only feasible approach for collecting outcome data on the health risks associated with these drugs. Additionally, randomized trials are needed to assess the effectiveness of integrated multi-pronged therapeutic interventions for treating the adverse effects of AASs and associated drugs, including interventions to address the vicious cycle of AAS-withdrawal hypogonadism, relapse, and dependence. It is important to raise awareness among the public, health care practitioners, and policy makers about the serious health consequences of AASs, the deleterious influence of body image disorders such as muscle dysmorphia, and the potential adverse influence of modern media images that falsely equate muscularity with masculinity.

ARTICLE INFORMATION

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innovative solutions that enhance precision and accuracy in clinical decision making and facilitate personalized therapeutic choices in reproductive health. No other disclosures were reported.

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