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Issues for DSM-V: Clarifying the Diagnostic Criteria For Anabolic-Androgenic Steroid Dependence

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Illicit anabolic-androgenic steroid (AAS) use represents a growing worldwide public health problem (1,2). Some AAS users consume only a few courses of these drugs in a lifetime, but others progress from discrete courses of use to a maladaptive pattern of almost continuous use, despite adverse medical, psychological, and social effects (3,4). In the last 20 years, accumulating animal and human studies have documented and characterized this syndrome of AAS dependence. For example, rats and mice will select AAS in conditioned place preference models (5), and hamsters will self-administer testosterone even to the point of death (6). Unlike rodents, humans may initially develop a pattern of AAS dependence as a result of “muscle dysmorphia” – a form of body dysmorphic disorder where they become preoccupied that they do not look adequately muscular (7). In later stages, however, AAS dependence comes to resemble “classical” drug dependence, with a well-defined withdrawal syndrome mediated both by neuroendocrine factors and by a variety of cortical neurotransmitter systems, especially the opioidergic system (5,8). AAS dependence may be associated with substantial medical and psychiatric morbidity, including hypertension, dyslipidemia, cardiomyopathy, persistent hypogonadism, major mood disorders, and progression to other forms of substance abuse and dependence, especially opioid dependence (2). The full magnitude of these risks is still unknown, because widespread AAS abuse did not spread from the athletic world to the general population until the 1980s (2), and only now are many AAS users becoming old enough to have established a dependence pattern and to have entered the age of risk for some of these adverse outcomes. Although AAS users historically have been reluctant to seek treatment (1, 9), these adverse outcomes may bring increasing numbers to clinical attention.

Importantly, unlike classical drugs of abuse, AAS are not ingested to achieve an immediate “high” of acute intoxication, but instead are consumed over a preplanned course of many weeks to achieve a delayed reward of increased muscularity. Therefore, the existing *DSM-IV* criteria for substance dependence, which were designed primarily for acutely intoxicating drugs, do not apply precisely to AAS. For example, criteria such as “using the substance in larger amounts than was intended,” or “giving up or reducing important activities because of substance use,” apply more easily to alcohol or cocaine than to AAS. But these considerations should not obscure the fact that AAS have definite psychoactive effects, including a potential for

addiction, that is likely underestimated because attention has focused on the drugs' muscle-building properties (1).

On the basis of the available literature (2–4,10) and clinical experience with AAS-dependent individuals, we would suggest that the existing *DSM* criteria could be adapted for diagnosing AAS dependence with only small interpretive changes (Table 1). AAS are presently the only major class of drugs scheduled by the Drug Enforcement Administration for which *DSM-IV* does not explicitly recognize a dependence syndrome (11); this omission could be rectified in *DSM-V* by offering these proposed interpretations for AAS dependence in a small table or in the accompanying text of the substance dependence section. Alternatively, *DSM-V* could initially propose these criteria only for research purposes, pending further evidence of their reliability and validity. In either case, clarified criteria for AAS dependence will likely improve recognition of this diagnosis among clinicians and researchers encountering the syndrome, and stimulate increased attention to this emerging public health problem.

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TABLE 1
DSM Substance Dependence Criteria (Shown in Bold), Interpreted for Diagnosing AAS Dependence (Shown in Plain Text)

A maladaptive pattern of AAS use, leading to clinically significant impairment or distress, as manifested by three (or more) of the following, occurring at any time in the same 12-month period:

1) Tolerance, as defined by either of the following:

(a) a need for markedly increased amounts of the substance to achieve intoxication or desired effect; for AAS this progression to markedly larger doses may be related to dissatisfaction with the previous level of desired effect (e.g., level of muscle mass)

(b) markedly diminished effect with continued use of the same amount of the substance (e.g., failure to maintain the same level of lean muscle mass on a given dose of AAS)

2) Withdrawal, as manifested by either of the following:

a) a characteristic withdrawal syndrome, characterized for AAS by two or more of the following features: depressed mood, prominent fatigue, insomnia or hypersomnia, decreased appetite, and loss of libido

b) AAS are used to relieve or avoid withdrawal symptoms.

3) The substance is often taken in larger amounts or over a longer period than was intended. For AAS, this may be manifested by repeatedly resuming courses of AAS use after a shorter "off" period than the individual had originally planned, or by eliminating "off" periods entirely.

4) There is a persistent desire or unsuccessful efforts to cut down or control substance use. For AAS, this may be manifested by unsuccessful attempts to reduce or stop AAS use because of prominent anxiety about losing perceived muscular size.

5) A great deal of time is spent in activities necessary to obtain the substance, use the substance, or recover from its effects. For AAS, this may be manifested by extensive time spent participating in muscle-related activities surrounding AAS use (e.g., time spent in weight training, attending to diet and supplement use, and associating with other AAS users) in addition to actual time spent obtaining and administering AAS.

6) Important social, occupational, or recreational activities are given up or reduced because of substance use. For AAS, this may be manifested by giving up important outside activities because of an extreme preoccupation with maintaining a supraphysiologic AAS-induced level of muscularity (e.g., the individual relinquishes outside activities for fear that these activities will cause him to miss workouts, violate dietary restrictions, or compromise his ability to use of AAS).

7) The substance use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance. For AAS, this includes medical problems such as gynecomastia, sexual dysfunction, hypertension, dyslipidemia, and cardiomyopathy; or psychological problems such as dysphoric mood swings, severe irritability, or increased aggressiveness.
