Addictive Behaviors 36 (2011) 949–958

Contents lists available at ScienceDirect

Addictive Behaviors

Development and validation of the appearance and performance enhancing drug use schedule ☆

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ARTICLE INFO

Keywords:
Anabolic–androgenic steroid
Polysubstance use
Body image disturbance
Compulsive exercise
Psychometrics
Appearance and performance enhancing drug use

ABSTRACT

Appearance-and-performance enhancing drug (APED) use is a form of drug use that includes use of a wide range of substances such as anabolic–androgenic steroids (AASs) and associated behaviors including intense exercise and dietary control. To date, there are no reliable or valid measures of the core features of APED use. The present study describes the development and psychometric evaluation of the Appearance and Performance Enhancing Drug Use Schedule (APEDUS) which is a semi-structured interview designed to assess the spectrum of drug use and related features of APED use. Eighty-five current APED using men and women (having used an illicit APED in the past year and planning to use an illicit APED in the future) completed the APEDUS and measures of convergent and divergent validity. Inter-rater agreement, scale reliability, one-week test–retest reliability, convergent and divergent validity, and construct validity were evaluated for each of the APEDUS scales. The APEDUS is a modular interview with 10 sections designed to assess the core drug and non-drug phenomena associated with APED use. All scales and individual items demonstrated high inter-rater agreement and reliability. Individual scales significantly correlated with convergent measures (DSM-IV diagnoses, aggression, impulsivity, eating disorder pathology) and were uncorrelated with a measure of social desirability. APEDUS subscale scores were also accurate measures of AAS dependence. The APEDUS is a reliable and valid measure of APED phenomena and an accurate measure of the core pathology associated with APED use. Issues with assessing APED use are considered and future research is considered.

1. Introduction

The purpose of this study is to describe the initial development and psychometric properties of the Appearance and Performance Enhancing Drug Use Schedule (APEDUS), a semi-structured interview designed to assess the key clinical features and phenomena associated with APED use. The APEDs are usually discussed under the rubric of anabolic–androgenic steroid (AAS) use or in the context of cheating athletes whose APED use varies by the demands of the sport and ever changing need to avoid detection (Bahrke & Yesalis, 2004; Kazlauskas, 2010; Millman & Ross, 2003). The data on human AAS or APEDs are sparse and limited to a handful of field studies (e.g. Bahrke, Wright, Strauss, & Catlin, 1992; Copeland, Peters, & Dillon, 2000; Evans, 1997; Kanayama, Hudson, & Pope, 2009d, 2009e; Lindstrom, Nilsson, Katzman, Janzon, & Dymling, 1990; Midgley, Heather, & Davies, 2001; Pope & Katz, 1994) and more recently several large sample studies conducted via the internet (Hildebrandt, Langenbucher, Carr, & Sanjuan, 2007; Parkinson & Evans, 2006; Perry, Lund, Deninger, Kutscher, & Schneider, 2005), which suggest that APED use is heterogeneous, but unified by the common goals of improved appearance or athletic/occupational performance. There are number of basic drug related features that have evolved out of this research, but there remains little standardization of drug-based or related phenomena such as body image disturbance, dietary control, or exercise. This limitation makes comparison across studies difficult and it has slowed attempts to develop a comprehensive and valid nosology for APED use. The APEDUS provides a comprehensive assessment of these core features.

1.1. The conceptual framework of APED use

The phenomenology of APED use has been viewed through several different conceptual frameworks. The most common of these frameworks is the classic AAS abuse-dependence model of drug addiction, which relates the primary drug-based pathology to the ability of AASs to hijack the motivation–reward system (Wood, 2008).

☆ This research was supported by National Institute on Drug Abuse grant NIDA R03 1R03DA022444-01 awarded to Dr. Hildebrandt (PI), Drs. Langenbucher, Loeb, and Hollander (Co-Is).

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doi:10.1016/j.addbeh.2011.05.002

In addition, this addiction framework builds upon observable and definable tolerance and withdrawal syndromes (Brower, Blow, Young, & Hill, 1991; Brower, Eliopulos, Blow, Catlin, & Beresford, 1990; Kashkin & Kleber, 1989), which are fundamental to defining substance use disorders (SUDs). However, these symptoms as well as other diagnostic features (e.g., impairment in occupational functioning, excessive time spent using or recovering from drug effects) of SUDs do not map well onto the phenomena of AAS use for several reasons. Specifically, AASs do not have a definable intoxication syndrome, the preoccupations and compulsive behavior are expressed in the domains of exercise, dietary control, and body image (as opposed to drug seeking), the acute effects of AASs do not lead to occupational impairment, and the distress associated with withdrawal is primarily related to changes in outward appearance or drop in performance (Kanayama, Brower, Wood, Hudson, & Pope, 2009a, 2009b). An expanded version of the abuse-dependence model uses associated features of compulsive exercise and body image disturbance to increase its validity (Kanayama et al., 2009a, 2009b), but maintains the SUD construct of drug dependence.

An alternative framework includes AAS use in the broader context of drug use aimed to alter one's appearance or improve occupational and physical performance (Hildebrandt et al., 2007). This latter framework considers three basic phenomenological features to be essential to the practice of APED use: (a) body image disturbance, (b) training and exercise, and (c) dietary control and is the basis for a revised theoretical approach that weighs each domain equally in the observed pathology of APED use (Hildebrandt et al., 2010b; Hildebrandt, Alfano, & Langenbucher, 2010a). This model assumes that none of the leading models of AAS use (eating disorders, sport psychology, substance use disorder, or body image disturbance) adequately captures this complex form of drug use. It also draws from the observed drug use patterns of most AAS users included in the published field studies, which suggest a pattern of multi-substance use that spans illicit substances (e.g., synthetic hormones, fertility medications, prescription pain killers, stimulants) to more widely available nutritional supplements, diet pills, and prohormones (Skarberg, Nyberg, & Engstrom, 2009). This expansive polypharmacy has been shown to correlate with negative physical and psychological consequences to APED use and be predictive of intentions for long-term use (Hildebrandt et al., 2007; Hildebrandt, Langenbucher, Carr, Sanjuan, & Park, 2006a). Finally, the latter framework recognizes the role of the APED lifestyle in the larger phenomena of APED use and specifically the role of experience and information exchange between users that occurs about drug use and management or prevention of side effects (Monaghan, 2002). The APEDUS is built on this larger theoretical framework that draws from the reported phenomenology of APED use in a "bottom-up" approach to defining and understanding APED use.

The approach to psychopathology utilized by the APEDUS is also intended to be transdiagnostic. Specifically, the severity ratings for items in the body image, exercise, and dietary sections of the APEDUS are designed to capture variability in cognitive or behavioral disinhibition, whether compulsive or impulsive in function. This approach is consistent with evolving neurobiological and phenomenological research unifying both compulsive and impulsive forms of psychopathology along a continuum (Fineberg et al., 2010; Grant & Potenza, 2006; van den Heuvel et al., 2010). Thus, the severity ratings of these APEDUS scales are grounded in the clinical models that identify difficulty inhibiting behavior or types of thinking as pathological, with more difficulty in these forms of inhibition reflecting a greater degree of psychopathology.

1.2. Core drug use phenomena

The AASs encompass the synthetic male sex hormones including testosterone, nortestosterone, and their derivatives (Shahidi, 2001) and are often the primary substance in a typical pattern of illicit APED use (Hildebrandt et al., 2007). The core feature of APED use is the APED "cycle", which refers to a pattern of planned duration, dosage, and drug type in which the APED user "stacks" these substances in efforts to maximize some functional or desired outcome (e.g., increased muscularity or athletic performance). Cycles are often followed by a period of post-cycle recovery, where APED users allow for stabilization of their hypothalamic–pituitary–gonadal (HPG) axis. There is likely a mild withdrawal syndrome among heavy APED users (Kanayama et al., 2009c) and evidence of the opiate-mediated reinforcing effects of androgens (Wood, 2004, 2008). The reinforcing aspects of other APEDS are less understood, and there are some animal data suggesting that AASs interact with other drugs of abuse such as cocaine (Martinez-Sanchis, Aragon, & Salvador, 2002) and other stimulants (Kurling, Kanakaapaa, & Seppala, 2008) to enhance their reinforcing properties.

Over the course of an APED cycle, users are likely to experience any of a wide range of side effects that vary in severity. Exploratory factor analyses of side effects among experienced APED users suggest a wide range of psychological, medical, endocrinological, musculoskeletal, cardiac, and sexual side effects that relate to both anabolic and catabolic substances (Hildebrandt et al., 2007). Although certain side effects are common, the probability of severe or long term consequences is unknown (Evans, 2004), but are likely to include negative cardiac effects (Samenuk et al., 2002; Urhausen, Albers, & Kindermann, 2004) and psychiatric disturbances for some APED users (Hall & Chapman, 2005). The most widely described of these psychiatric consequences is an elevation in aggression, hostility, and irritability (Trenton & Currier, 2005).

APED users also report a number of unique benefits to APED use including gains in strength and muscle mass, confidence, sex drive, ability to concentrate, or feelings of dominance (Hartgens & Kuipers, 2004; Hildebrandt et al., 2006a). These desired consequences mirror self-reported motivations for AAS use which also include functional outcomes such as increasing the ability to commit a crime and fighting ability (Copeland et al., 2000; Petersson, Bengtsson, Voltaire-Carlsson, & Thiblin, 2010). The primary use of AASs and other APEDs, however, is for changes to outward appearance via alteration to muscle mass and body fat. The data largely support the ability of AASs and other anabolics such as insulin-like growth factor (IGF-1) or human growth hormone (HGH) to increase muscle and reduce body fat (Bhasin et al., 1996; Birzniece, Nelson, & Ho, 2010; Frisch, 1999; Hoffman et al., 2009; Woodhouse et al., 2003; Woodhouse et al., 2004). The effects of stimulants or other drugs such as thyroid hormones on body fat reduction are not well documented in this population, although certain drugs such as ephedrine are known to have efficacy for short-term weight loss in obese populations (Molnar, Torok, Erhardt, & Jeges, 2000).

1.3. Core behavioral and attitudinal features

In addition to strictly drug related phenomena, APED use includes exercise and dietary patterns aimed at achieving appearance or performance specific goals. Although little systematic data exist documenting dieting or exercise patterns of APED users, these practices are considered essential to the desired effects of APEDs. For instance, APED users, particularly those who are bodybuilders, will often strictly adhere to prescribed macronutrient and caloric regimens (Lambert, Frank, & Evans, 2004). Among some APED users, these practices may develop into a pattern of binge eating, dietary restraint, and purging similar that that found among women with bulimia nervosa (Goldfield, Blouin, & Woodside, 2006). In a community sample of male weightlifters, Hildebrandt, Schlundt, Langenbucher, and Chung (2006b) found evidence for a specific subgroup with elevated symptoms of binge eating and purging that co-occurred with the highest rates of legal and illegal APED use. Thus,