

Personality Profile of Men Using Anabolic Androgenic Steroids

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The present study assessed personality traits in three groups of strength athletes, who self-administered anabolic androgenic steroids (AAS) at the time of testing, had stopped using AAS since at least 6 months, or had never used AAS. The subjects ($n = 14/\text{group}$) completed the Karolinska Scales of Personality, an inventory consisting of 15 subscales measuring traits related to anxiety proneness, extraversion, and aggression–hostility. Current AAS users differed significantly from the other two groups with respect to Verbal aggression. In comparison to subjects with no ongoing AAS exposure (i.e., previous AAS users and drug-free controls), AAS users were also significantly different with respect to Muscular tension, Social desirability, Impulsiveness, and Indirect aggression. On several subscales, the scores of the AAS users were clearly outside the normal range observed in general population. The present results confirm earlier studies that AAS use is associated with enhanced aggressiveness. Our study also suggests that self-administration of AAS might pave the way for disinhibitory psychopathology by amplifying extraversion-related risk factors. © 1996 Academic Press, Inc.

A large number of animal experimental studies show that testicular androgens, such as testosterone, profoundly influence sexual and aggressive behavior. For example, in the well-researched laboratory rat, it is well known that castration reduces copulation and social aggression, and that testosterone administration restores these behaviors to preoperative levels (Albert,

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Walsh, and Jonik, 1993; Bergvall and Hansen, 1990; Hansen and Bergvall, 1990; Young, Goy, and Phoenix, 1964). These behavioral effects are mainly due to testosterone's interacting with steroid-sensitive hypothalamic areas, the medial preoptic area and the ventromedial nucleus being considered particularly important targets for sexual behavior (Christensen and Clemens, 1974; Davidson, 1966) and social aggression (Albert, Dyson, and Walsh, 1987), respectively.

While it is true that human behavior is much liberated from direct hormonal commands, significant influences of gonadal sex hormones do exist, at least with regard to sexuality. Thus, low sexual interest is observed in the majority of hypogonadal and long-term castrated men, and testosterone treatment of such males improves it (Bancroft and Skakkebaek, 1979). With regard to human aggression, there are reports of significant positive associations between plasma testosterone and various measures of aggression or hostility (e.g. Olweus, Mattson, Schalling, and Löw, 1988). As pointed out by Albert and co-workers (1993), however, the relationship between androgens and human aggression remains tenuous: for example, while there is a clear-cut increase in sexual activity at the time of puberty (when testosterone levels rise), there is no equally apparent increase in aggressiveness during this period in boys.

The question of androgenic influences on human behavior takes on added importance considering the relatively recent trend among predominantly young men to self-administer massive doses of anabolic androgenic steroids (Yesalis, Kennedy, Kopstein, and Bahrke, 1993). Taken with the purpose of potentiating the muscle-building effect of physical exercise (Kibble and Ross, 1987), anabolic androgenic steroids (AAS) appear in addition to exert psychological and even addictive actions (Kashkin and Kleber, 1989; LaBree, 1991; Pope and Katz, 1988; Svare, 1990; Uzych, 1992). The perhaps most widely publicized effect is the increased incidence of indiscriminate, unprovoked rage attacks known as roid

rage (Conacher and Workman, 1989; LaBree, 1991; Lumia, Thorner and McGinnis, 1994; Orchard and Best, 1994; Rejeski, Brubaker, Herb, Kaplan, and Koritnik, 1988). Increased aggression as a consequence of AAS self-administration is also indicated by psychometric studies where AAS users generally score higher on aggression–hostility scales (Choi, Parrot, and Cowan, 1990; Su, Pagliaro, Schmidt, Pickar, Wolkowitz, and Rubinow, 1993; Yates, Perry and Murray, 1992; but see Bahrke, Wright, Strauss, and Catlin, 1992) as well as by reports of increased violence by AAS users toward wives and girlfriends (Choi and Pope, 1994).

The present study employed the Karolinska Scales of Personality (Schalling, 1993) to obtain a broader portrait of the personality profile associated with AAS use. Consisting of 15 scales, this inventory not only provides information regarding the predilection for aggression–hostility but also for anxiety proneness and extraversion-related traits. The results of the AAS users were contrasted to the profiles obtained in two other groups: past AAS users, who had stopped hormone self-administration since several months, and drug-free young men, who reported never to have self-administered AAS.

MATERIALS AND METHODS

Subjects

A total of 70 male bodybuilders who trained regularly (≥ 3 times/week since ≥ 1 yr) at either of two gyms in the Göteborg city area were approached personally by the first author (himself a practicing bodybuilder and at least superficially known to all subjects). Granted anonymity, they were asked to partake in a study concerning the psychological effects of AAS. If assenting to participate (see Results), the subject was interviewed for information about age, training habits, socioeconomic status, and AAS use. He then completed the KSP inventory (paper-and-pencil version) and was paid SEK 50.

Assessment Measures

The socioeconomic standing (i.e., education and occupation) of each participant was transformed into a Hollingshead (1975) score, which can range between 8 (low socioeconomic status) and 66.

The KSP inventory is composed of 15 subscales that can be divided into three main groups (Schalling, 1993; see also Helleday, Edman, Ritzén, and Siwers, 1993).

The five *Anxiety proneness* scales are Somatic anxiety (autonomic disturbances, restlessness), Muscular tension (muscular tenseness and aches, difficulties in relaxing), Psychic anxiety (worrying, lacking self-confidence), Psychasthenia (easily fatigued), and Inhibition of aggression (unexpressed anger, cannot speak up, non-assertive). The five *Extraversion* scales are Impulsiveness (acting on the spur of the moment, non-planning), Monotony avoidance (need for change and action), Detachment (need for social distance, and coldness in social relations), Socialization (positive childhood experiences, good family adjustment), and Social desirability (socially conforming, helpful, “faking good”). The five *Aggression–Hostility* scales include Indirect aggression (sulking, slamming doors), Irritability (being easily annoyed, quick to anger), Verbal aggression (getting into arguments, shouting, quarreling, cursing), Suspicion (distrusting people’s motives), and Guilt (feelings of remorse and shame).

All scales have 10 items except the Socialization scale and the Aggression–Hostility scales which have 20 and 5 items, respectively, and have a four-choice response format. The scales measure personality traits which have shown a high test–retest stability over 5 years (Kampe, Edman, and Hannerz, 1991).

Statistics

The results are presented as median \pm median absolute deviation (MAD). Considering the relatively small number of participants, group differences were statistically assessed by non-parametric methods using Stat-View (Abacus) software. Overall group differences were analyzed with the Kruskal-Wallis one-way analysis of variance. The Mann–Whitney *U* test was used for the pairwise comparisons between medians using Holm’s (1979) sequential rejective test procedure for adjustments of the two-tailed *P* levels.

RESULTS

Thirty current AAS users, 25 past AAS users and 15 nonusers were asked to participate in the study. Out of these 16 (53%), 11 (44%), and 1 (7%) declined to participate. This difference in drop-out rate was statistically significant ($\chi^2 = 9.34$, $P < .01$). The dropouts were for the most part elite bodybuilders. Thus the participants in the present study ($n = 14$ /group) can be regarded as recreational athletes.

Over 25 brands of AAS were used/had been used by the current and past AAS users, respectively. The

TABLE 1
Background Data for AAS Users ($n = 14$), Past AAs Users ($n = 14$) and Drug-Free Controls ($n = 14$)

	Age	Social status	Time spent training (hr/week)	Mental occupation with training (hr/day) ^a
AAS users	21 ± 2	24.0 ± 8.0	8.3 ± 2.3	2.5 ± 1.3
Past AAS users	25 ± 5	26.5 ± 6.0	8.6 ± 1.3	1.0 ± 0.5
Drug-free	23 ± 3	28.0 ± 4.0	7.2 ± 1.4	1.0 ± 0.5
H(2)	2.01	1.19	0.91	13.33
<i>P</i>	ns	ns	ns	0.001

Note. Data are presented as median ± MAD.

^a Reported time spent planning, preparing, and thinking about bodybuilding-related issues when outside the gym.

most common ones were Sustanon and Primoteston for intramuscular injection, supplemented with 5 mg of methandienon tablets for oral use. The reported hormone intake of the current AAS users ranged between 175–1300 mg/week; similar figures were mentioned by the past AAS users. Many subjects were unable to give an exact account of their AAS usage.

Table 1 shows that there were no group differences with respect to age, Hollingshead scores for social position or the estimated time spent training at the gym. However, AAS users reported spending significantly more time planning, preparing, and thinking about their bodybuilding exercises than the other groups (Table 1).

Before analysis, the raw data from the KSP inventory were transformed into *T* scores where the mean ± standard deviation (*SD*) is 50 ± 10 in a representative sample of 20- to 34-year-old men (Bergman, Bergman, Englebretsson, Holm, Johannesson, and Lindberg, 1982). Table 2 shows that there was a highly significant overall group difference with respect to Verbal aggression. Pairwise comparisons between medians revealed that current AAS users were more verbally aggressive than the past AAS ($U = 50.5$, $P < .03$) and drug-free ($U = 38.5$, $P < .006$) groups. The two latter groups did not differ from each other ($U = 72$, ns). No other statistically significant group differences were found with respect to other personality factors.

To compare the effect of ongoing as opposed to no current AAS exposure, data from past AAS users and drug-free controls were collapsed into one group ($n = 28$). Table 3 shows that in comparison to this group the current AAS users scored significantly higher on Muscular tension, Impulsiveness, Indirect aggression, and Verbal aggression, and significantly lower on Social desirability.

Examination of the median *T* scores for the current AAS users shows that it was ≥ 1 *SD* above the mean

with regard to Muscular tension, Psychasthenia, Impulsiveness, Monotony avoidance, Indirect aggression, Verbal aggression, and Irritability. This means that with regard to these aspects of personality, the current AAS users were clearly outside the normal range observed in the general population of men of the same age.

DISCUSSION

The present study examined the personality profile in three groups of young male bodybuilders. The groups were similar with respect to median age, average socioeconomic status and time spent exercising at the fitness center, but differed as to whether AAS were being, had ever been (>0.5 year), or had never been used to increase muscle volume and strength. Needless to say, there are problems with this type of study. For example, one would have preferred to have independent validation of the subjects' reports concerning AAS usage. However, because possession of AAS is a legal offense in Sweden which can lead to 2 years of imprisonment, it would have been very difficult indeed to persuade the subjects to leave blood or urine samples for this purpose. Consequently, we cannot judge whether the subjects were truthful concerning their AAS usage. This means, for instance, that subjects in the drug-free group might in fact have been current or past AAS users. It is also true, however, that AAS-using members of the muscle and fitness subculture, although most secretive toward outsiders, are generally quite frank about their hormone habits among themselves. Thus, since the interviewer/test administrator (N.G.) belonged to this subculture, and since the subjects' reports agreed with hearsay, we feel reasonably confident that most participants were in fact grouped correctly.

Another complicating aspect of the study was the significant difference in drop-out rate between the

TABLE 2
Personality Profile (Median \pm MAD) of AAS Users ($n = 14$), Past AAS Users ($n = 14$), and Drug-Free Controls ($n = 14$) as Assessed with the Karolinska Scales of Personality (KSP)

Scales	AAS users	Past AAS users	Drug-free	H
Anxiety proneness				
Somatic anxiety	56.0 \pm 5.0	56.0 \pm 7.0	52.5 \pm 7.5	2.42, ns
Muscular tension	60.0 \pm 11.0	53.5 \pm 9.5	52.5 \pm 8.5	4.33, ns
Psychic anxiety	51.0 \pm 8.0	52.0 \pm 7.0	54.0 \pm 4.0	0.26, ns
Psychasthenia	61.0 \pm 11.0	56.0 \pm 6.5	50.0 \pm 4.5	2.90, ns
Inhibition of aggression	42.5 \pm 10.5	45.0 \pm 6.0	51.5 \pm 7.5	3.06, ns
Extraversion				
Socialization	41.0 \pm 9.0	44.5 \pm 9.0	43.0 \pm 7.0	1.45, ns
Social desirability	40.5 \pm 9.5	45.0 \pm 6.0	54.0 \pm 4.5	3.56, ns
Impulsiveness	62.0 \pm 13.5	54.5 \pm 10.5	50.0 \pm 9.0	3.66, ns
Monotony avoidance	65.5 \pm 10.5	50.0 \pm 11.0	58.5 \pm 9.0	1.61, ns
Detachment	45.5 \pm 7.5	48.5 \pm 9.5	47.0 \pm 3.0	0.68, ns
Aggression-hostility				
Indirect aggression	60.5 \pm 7.5	54.0 \pm 6.5	50.5 \pm 5.0	5.43, ns
Verbal aggression	66.0 \pm 6.5	57.0 \pm 5.0	47.0 \pm 5.5	9.22, $P = 0.01$
Irritability	61.5 \pm 9.0	50.0 \pm 9.0	57.0 \pm 9.0	2.98, ns
Suspicion	54.0 \pm 4.0	54.0 \pm 8.5	54.0 \pm 3.0	0.59, ns
Guilt	53.0 \pm 4.0	49.0 \pm 5.5	49.0 \pm 4.0	0.12, ns

Note. Values are T scores.

groups. Roughly half of the current and past AAS users declined to participate, whereas almost all nonusers agreed to complete the questionnaire. It was our distinct impression that the majority of the drop-outs were elite bodybuilders, who did not wish to be bothered about

the adverse psychological side effects of AAS usage. Given this carefree attitude, it is quite possible that these drop-outs might have scored high on scales related to extraversion and aggression-hostility. For example, it is known that another group of substance

TABLE 3
Karolinska Scales of Personality (KSP) Profile (Median \pm MAD) in Subjects Currently Exposed to AAS ($n = 14$) or Being Drug-Free at the Time of Testing ($n = 28$)

Scales	Current AAS exposure	No current AAS exposure	U	P
Anxiety proneness				
Somatic anxiety	56.0 \pm 5.0	55.0 \pm 6.0	164.5	ns
Muscular tension	60.0 \pm 11.0	53.5 \pm 8.5	118.5	0.04
Psychic anxiety	51.0 \pm 8.0	54.0 \pm 5.0	179	ns
Psychasthenia	61.0 \pm 11.0	53.0 \pm 7.0	139	ns
Inhibition of aggression	42.5 \pm 10.5	49.0 \pm 8.0	149.5	ns
Extraversion				
Socialization	41.0 \pm 9.0	44.5 \pm 8.5	151.5	ns
Social desirability	40.5 \pm 9.5	46.5 \pm 7.5	129.5	0.07
Impulsiveness	62.0 \pm 13.5	53.0 \pm 9.0	128.5	0.07
Monotony avoidance	65.5 \pm 10.5	50.0 \pm 10.5	164.5	ns
Detachment	45.5 \pm 7.5	47.0 \pm 5.5	169.5	ns
Aggression-hostility				
Indirect aggression	60.5 \pm 7.5	52.0 \pm 6.0	112	0.02
Verbal aggression	66.0 \pm 6.5	52.5 \pm 7.0	89	0.004
Irritability	61.5 \pm 9.0	50.0 \pm 9.0	137	ns
Suspicion	54.0 \pm 4.0	54.0 \pm 4.0	190	ns
Guilt	53.0 \pm 4.0	49.0 \pm 4.0	183	ns

Note. Values are T scores.

abusers, the so-called Type 2 male alcoholics, worry little about the drinking problem and display high scores on extraversion- and aggression-hostility scales (Linnoila and Virkkunen, 1992; von Knorring, von Knorring, Smigan, Lindberg, and Edholm, 1987). This source of systematic error would thus result in an actual underestimate of such dimensions of personality in AAS groups.

It was found that the current AAS users reported spending significantly more time thinking, planning, and preparing their bodybuilding activities than the past AAS users or the drug-free controls. Importantly, they also scored significantly higher on Verbal aggression than the other groups. The latter result confirms previous reports (Choi *et al.*, 1990; Yates *et al.*, 1992) that AAS users show elevated scores on Verbal aggression subscale of the Buss-Durkee inventory, which is similar to the KSP (Schalling, 1993). In the absence of information on the level of Verbal aggression prior to AAS use, it cannot be excluded that our subjects were verbally aggressive also before starting to self-administer hormones. However, in the present study we found that subjects who had stopped taking AAS scored significantly lower than current AAS users on Verbal aggression. This observation, together with the finding in a prospective study of healthy young men that AAS increases aggressive feelings (Su *et al.*, 1993), indicate that the increase in verbal aggressiveness was at least in part hormonally mediated. Also, animal studies show that AAS administration to gonadally intact males increases aggressive behavior (Lumia *et al.*, 1994; Rejeski *et al.*, 1988).

The stimulatory effect of exogenous testosterone on sexual activity in hormone-deficient men disappears about 3 weeks after the cessation of treatment (Bancroft and Skakkebaek, 1979). Such observations indicate that the past AAS users, having been AAS-free for at least half a year, were quite similar in neuroendocrine terms to the drug-free group and that the data from these two groups be collapsed. When analyzed in this way, current AAS exposure was not only found to be associated with enhanced Verbal aggression but also with increased Indirect aggression. The level of Muscular tension, an anxiety-related trait, was also enhanced. Moreover, subjects under AAS exposure reported a low level of Social desirability and a high level of Impulsiveness (P 's < .07). It is noteworthy that the group medians of current AAS users with respect to Verbal-Indirect aggression and Impulsiveness were more than 1 *SD* above the mean observed in the general male population in the 20-34 age span; this was true also with regard to Monotony avoidance, Irritability and

Psychasthenia. The exceptional scores on several personality factors are noteworthy considering that the KSP is especially constructed to measure vulnerability for different forms of psychopathology (Schalling, 1993).

There is a vast literature linking high levels of impulsiveness, monotony avoidance and aggressiveness to various forms of disinhibitory psychopathology (Gorenstein and Newman, 1980), including alcoholism, firesetting, impulsive violence and suicide (Linnoila and Virkkunen, 1992; Schalling and Åsberg, 1985). In turn, constellations of personality traits such as these have been associated with various biological parameters, such as low central serotonin turnover, low levels of platelet monoamine oxidase or hypoglycemia in a glucose tolerance test (Apter, van Praag, Plutchik, Sevy, Korn, and Brown, 1990; Linnoila and Virkkunen, 1992; Schalling, 1993; Schalling and Åsberg, 1985; Schalling, Edman, Åsberg, and Orelund, 1988). It is possible that AAS, administered in massive doses and for protracted periods of time, induce psychological changes by affecting such neurobiological mechanisms. For example, with regard to serotonin, it is known from animal experimental work that pharmacological lowering of brain serotonin levels facilitate testosterone-dependent behaviors, such as male sexual behavior (Södersten, Larsson, Ahlenius, and Engel, 1976) and intermale aggression (Vergnes, DePaulis and Boehrer, 1986). Such observations suggest a close functional relationship between androgens and central serotonin mechanisms that might be relevant also for the understanding of AAS effects on personality.

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