Perceived source of anabolic-androgenic steroids and the construal of users' personality

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Q3: Au: As per journal style "et al." is not used in the references list. Please provide all author names in order to complete the reference "McCrae et al., 2005".

Q4: Au: Please explain the significance of the bold values in Table 1.

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ABSTRACT

Users obtain anabolic-androgenic steroids (AAS) from various sources, and it is unclear if perception of these sources has an effect on observers' construal of users' personality. We investigated the influence of observers' perceived source of AAS on their construal of users' personality. A total of 283 individuals (209 females; mean age = 26.84 years) recruited online were randomized to three independent experimental scenarios or vignettes differing only in the source of AAS used by the protagonist: the Internet ($n = 91$), trainer/coach ($n = 91$), and physician/doctor ($n = 101$). Participants in all three conditions rated their protagonist on the NEO Five-Factor Inventory. Multivariate analysis of variance results indicated no significant between-group differences on personality ratings of the protagonists. It is evident that observers' perceived source of AAS does not influence their construal of users' personality.

Introduction

Anabolic-androgenic steroid(s) (AAS) refer to testosterone and its synthetic derivatives. Historically, sportsmen and athletes have since the 1950s used these hormones to facilitate muscle growth and enhance sports performance, but their widespread distribution and illicit use among the general population first became prevalent in the 1980s. Epidemiological evidence on AAS use indicates a global lifetime prevalence rate of 3.3% (Sagoe et al., 2014). Due to the enervating outcomes associated with long-term use (Bjørnebekk et al., 2016; Elkins et al., 2016; Pope Jr & Kanayama, 2012)), their proliferation is regarded an issue of serious public health concern (Sagoe et al., 2014).

The dissociation model (Devine, 1989) postulates that prejudice can be assessed both explicitly (with an individual's awareness) and implicitly (without an individual's awareness) (Wittenbrink et al., 2001). Implicit personality theory (IPT; Bruner & Tagiuri, 1954) describes the means through which observers link others' attributes or why people behave the way they do (Schneider, 1973). In implicit assessment of prejudice, the elicitation of a negative response upon exposure to a member or symbol of a group is deemed as symptomatic of prejudice (Brauer et al., 2000).

Differences in personality are important in the understanding of human cognition, motivation, behavior, and development (Buss, 1991). The Five Factor Model (FFM; Costa & McCrae, 1992) is a popular and well-tested categorization of normal personality comprising five personality dimensions: neuroticism (negative emotions such as fearfulness and aggression), extraversion (people skills and need for social contact with others), openness (creativity and intelligence), agreeableness (ability to communicate and cooperate in groups), and conscientiousness (reliability, planning, and efficiency). The dynamic relationship between these traits constitutes an individual's personality.

Many individuals initiate and continue AAS use for extended periods in order to enhance their body image, attractiveness, and social approval (Sagoe et al., 2014). These individuals, previously referred to as aesthetes (Brower, 1989) or aesthetic users (Evans-Brown & McVeigh, 2008), body image users (Enaker, 2013; Peters et al., 1997), and cosmetic users (Evans-Brown et al., 2012), constitute an important subpopulation of AAS users. However, there is contention regarding the body image or aesthetic benefits of AAS use. In this regard, some studies have been conducted on observers' perception of AAS users' social image and personality (Chantal et al., 2009, 2013; Sagoe et al., 2016; Schwerin & Corcoran, 1992, 1996; Van Raalte et al., 1993; Yu et al., 2015). These studies unanimously show that perceived AAS use has negative consequences on the construal of users' social image and personality. However, further research is needed to highlight how AAS use harms users' social image and personality (Chantal et al., 2013; Sagoe et al., 2016; Yu et al., 2015).

Users obtain their AAS from various sources, mainly the illicit market (e.g., the Internet), training associates (e.g., coaches or trainers), and clinicians or health workers (e.g., doctors or physicians) (Sagoe et al., 2014). It is not clear whether these sources play an influential role in the perception of AAS users' personality. The purpose of the present study was therefore to extend existing knowledge on the construal of AAS users' personality by providing further understanding of how AAS sources influence the perceptions of users' personality. Extending previous studies reviewed above and our previous experiment (Sagoe et al., 2016), we aim to shed light on how the sources influence the assessment of an AAS-using

protagonist's personality where the user's source is either (a) the Internet or (b) trainer/coach or (c) physician/doctor. In this regard, it should be noted that importation without license and non-medical use of AAS is illegal in Norway. This implies that those who import and use AAS in Norway by such conduct per se engage in more legal violations than those obtaining AAS from their trainer or doctor.

To our knowledge, the present investigation in its focus on sources of AAS is pioneering, thereby presenting difficulties with predictions. Nonetheless, we are guided by previous findings (Sagoe et al., 2016), public health concerns regarding the widespread availability of illicit drugs, and AAS in particular, on the Internet (McBride et al., 2016; Orsolini et al., 2015) as well as concern regarding AAS source credibility (Kimergård & McVeigh, 2014). Hence, we hypothesize that the Internet-sourcing AAS user will be rated as more neurotic compared to the trainer-sourcing and physician-sourcing users. We also hypothesize that the Internet-sourcing user will have comparatively lower ratings on agreeableness, and conscientious.

Methods

Design

We used a scenario-based role-playing experiment (SBRPE) in the present study. In an SBRPE, a vignette or scenario containing predetermined variables is presented to participants. They then provide or document responses to the vignette or scenario. An analysis of the responses is then conducted to highlight how different variables presented in the vignette or scenario influence participants' responses and reactions (Rungtusanatham et al., 2011).

Participants

Respondents were 283 (209 females) individuals recruited online. Their ages ranged from 12 to 63 years ($M = 26.84$, $SD = 8.9$). They were randomized to the three independent experimental conditions/sources of AAS: the Internet ($n = 91$, females = 67), trainer/coach ($n = 91$, females = 66), and physician/doctor ($n = 101$, females = 76).

Measures

Demographics: The questionnaire requested the age and sex of participants.

Vignettes/scenarios: The following vignette from a previous study (Sagoe et al., 2016) was presented to the three groups: "The alarm clock rang. N put it in a 5-minute snooze. He repeated this six times before getting up. He showered, ate breakfast and got ready to go to the reading hall. He met a fellow student at the bus stop. N said hello to his fellow student and began a lively conversation with him. The bus arrived and N entered. After a few stops, a man with a big dog got onto the bus. The sight of the big dog gave N some palpitations and discomfort. When the bus stopped at the reading hall, there was a lady with a pram next to N. N did not offer to help her off the bus with the pram, and hurried off instead. When N finally came to the reading hall, he sat down at his usual place. He had sorted textbooks and notes in a neat and tidy order on the shelf in front of him. At 12:00, N went for a lecture. The lecture was about various complicated theories, but N nevertheless followed closely. When N returned to the dormitory that afternoon, one of those he lived with started to clean the kitchen. Despite the fact that it actually was this person's turn to be in charge of the kitchen, N still helped to clean up. N enjoyed training at the gym and later packed his gym bag with the items he would need for his training session at the gym. Prior to this, he used anabolic steroids which he got from [the internet (1st condition), his coach (2nd condition), his doctor (3rd condition)]. He chose the shortcut across the cemetery on the way to training, even though it was dark and the cemetery was poorly lit. This did not bother him. On his way into the gym, he noticed that posters were displayed advertising courses in creativity. N had no interest in this and did not read the posters further. He then entered the fitness center and exercised. After returning home from training, N went through his usual evening routine and went to bed."

The only difference in the vignettes pertained to the protagonist's source of AAS used before training: *the Internet* (1st condition); *the trainer/coach* (2nd condition); *the physician/doctor* (3rd condition).

Personality: Ratings of the protagonist were gathered using the observer-rating version of the NEO Five Factor Inventory (NEO-FFI; Costa & McCrae, 1992). The five personality traits assessed in the NEO-FFI are neuroticism, extraversion, openness, agreeableness, and conscientiousness. Respondents indicate the precision of 60 statements/items about the protagonist on a scale from 0 (strongly disagree) to 4 (strongly agree). Twenty-seven items are reverse-scored. Each personality trait comprises 12 items. Ratings on each personality trait are obtained by adding the 12 corresponding items on the trait. Possible total scores on each trait thus ranges from 0 to 48. Per the general population norms from the U.S. (Rudow et al., 2014), T-scores of 56 or higher represent a high score, T-scores lower than 44 are considered low, and T-scores between 45 and 55 are average (Costa & McCrae, 1992). In the present study, the NEO-FFI had the following Cronbach's alphas: neuroticism = 0.80, extraversion = 0.78, openness = 0.63, agreeableness = 0.75, and conscientiousness = 0.81.

Procedure

Respondents were invited to participate in the study online via posts on social media and email invitations. Included in the invitation was a URL redirection link. Clicking on the link randomly directed prospective participants, by a consecutive randomization procedure, to one of the three online vignettes and questionnaires. Reading the specific vignette and completing the questionnaire finalized the randomization of participants to one of the three conditions. Figure 1 presents a conceptual framework of the recruitment and randomization process.

The first page briefly presented information about the study and instructions for completing the questionnaire. Participants then provided data on age and sex. Next, the
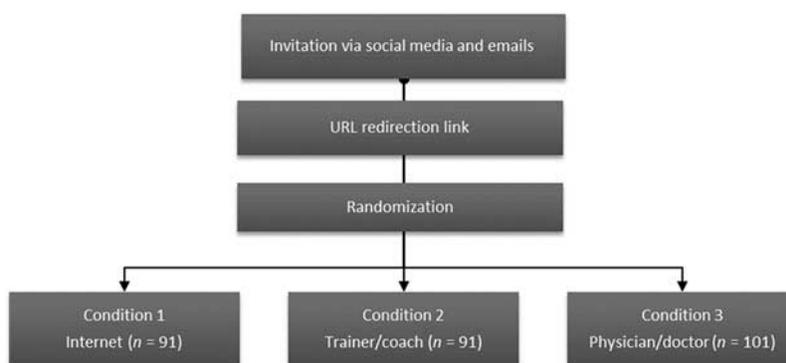
Figure 1. The recruitment and randomization process.

respective vignette was presented. After reading the vignette, participants provided ratings of their respective protagonist. This procedure ensured the emergence of the three independent experimental groups. The questionnaires were available in Google Forms (Google Inc.), an Internet-based survey tool. Data collection lasted for approximately four months (February, 2016 to May, 2016).

Statistical analysis

The personality ratings were first converted into T-scores for the analyses. Next, age differences between the three groups were examined using one-way between-groups ANOVA. In order to investigate sex differences between the three groups, Chi-square test for independence was executed. We then conducted multivariate analysis of variance to examine if personality ratings of the protagonist were influenced by: (a) the experimental condition/AAS source, (b) sex, or (c) the interaction of the experimental condition and sex. The statistical analyses were conducted using SPSS version 23.0 (IBM Corp., 2014).

Results

Between-group age and sex comparison

Results showed a significant age difference between the groups [$F_{(2, 282)} = 5.308$, $p = 0.005$]. Participants in the Internet condition were older ($M = 29.03$, $SD = 10.82$) compared to participants in the trainer/coach condition ($M = 24.80$, $SD = 6.34$). There was no significant sex difference between participants in the three conditions [$\chi^2_{(2)} = 0.19$, $p = 0.911$, Cramer's $V = 0.026$].

Between-group differences in personality ratings

Table 1 presents results of the multivariate analysis of variance of personality trait ratings (T-scores) across experimental condition, sex, and the interaction effect of experimental condition and sex.

Results of the multivariate analysis of variance, in contrast to our hypotheses, indicated no significant differences between the groups in terms of personality ratings of the protagonist [$F_{(10, 548)} = 0.840$, $p = 0.590$, Pillai's trace = 0.030, $\eta_p^2 = 0.015$].

Sex differences in personality ratings

There were significant sex differences in ratings of the protagonist [$F_{(5, 273)} = 13.562$, $p = 0.000$, Pillai's trace = 0.199; $\eta_p^2 = 0.199$] on neuroticism [$F_{(1, 277)} = 20.970$, $p = 0.000$, $\eta_p^2 = 0.070$], openness [$F_{(1, 277)} = 4.825$, $p = 0.029$, $\eta_p^2 = 0.017$], and agreeableness [$F_{(1, 277)} = 19.139$, $p = 0.000$, $\eta_p^2 = 0.065$] with females providing higher ratings than males on all three traits. See Table 1.

Interaction effect of group and sex on personality ratings

There was no significant interaction effect of the experimental condition and sex on personality ratings [$F_{(10, 548)} = 0.915$, $p = 0.519$, Pillai's trace = 0.033; $\eta_p^2 = 0.016$]. See Table 1.

Table 1. Results of multivariate analysis of variance of personality trait ratings across experimental conditions, sex, and the interaction of condition and sex.

| | Condition | | | | Sex | | | Interaction |
| | Internet (n = 91) | Trainer/coach (n = 91) | Physician/doctor (n = 101) | | Female (n = 209) | Male (n = 74) | | Condition x sex |
Personality trait	Mean (SD)	Mean (SD)	Mean (SD)	F (η_p^2)	Mean (SD)	Mean (SD)	F (η_p^2)	F (η_p^2)
Neuroticism	58.05 (7.17)	56.01 (6.90)	57.40 (7.55)	3.432 (0.024)	58.31 (6.96)	53.93 (7.11)	**20.970**** (0.070)	2.880 (0.020)
Extraversion	36.74 (7.48)	37.62 (8.10)	36.36 (9.77)	0.761 (0.005)	36.59 (8.65)	37.70 (8.21)	0.798 (0.003)	1.604 (0.011)
Openness	33.23 (7.22)	33.33 (6.95)	33.75 (6.90)	0.346 (0.002)	33.99 (6.70)	31.92 (7.64)	**4.825*** (0.017)	0.331 (0.002)
Agreeableness	35.93 (9.89)	35.69 (9.42)	36.59 (10.71)	0.313 (0.002)	37.60 (10.29)	31.84 (7.84)	**19.139**** (0.065)	0.984 (0.007)
Conscientiousness	52.23 (8.12)	52.78 (7.18)	51.32 (10.30)	0.252 (0.002)	52.19 (8.87)	51.77 (8.21)	0.163 (0.001)	0.274 (0.002)

Personality ratings are T-scores.
**$p < 0.001$, *$p < 0.05$

Discussion

We investigated the influence of perceived source of AAS used on the perception of users' personality through a scenario-based role-playing experiment with three conditions: an Internet-sourcing AAS user, a physician-sourcing AAS user, and a trainer-sourcing AAS user. Contrary to our hypothesis, we found no statistically significant differences in personality ratings of the protagonist between the three conditions. Recent work has shown that AAS users in particular are perceived as higher on neuroticism compared to non-users (Sagoe et al., 2016). Additionally, the perception of AAS use can lead to stigmatization of users even by health professionals (Yu et al., 2015) who play an important role in the provision of essential ameliorative or therapeutic healthcare for users. Hence, combined with findings from earlier studies, the present result shows that an observer's knowledge of the source of AAS used by an individual does not play an influential role in producing a negative stereotype or stigmatizing effect of users.

Moreover, there were significant between-group differences for sex with females providing higher ratings than males on neuroticism, openness, and agreeableness. This finding is in agreement with results from cross-cultural research on sex differences in personality traits showing that females generally provide higher observer ratings on neuroticism and agreeableness than males (McCrae et al., 2005). Finally, in agreement with previous evidence (Sagoe et al., 2016), the experimental condition and sex did not have a significant interaction effect on personality ratings.

Implications of findings

It is important that efforts are intensified to prevent AAS use and its potential harmful effects. Preventive interventions must highlight the negative stereotype or stigmatizing effects of AAS use in the effort to convince at risk persons of the personality and social harms of AAS use. Additionally, many AAS users do not trust health providers believing that health professionals usually have poor knowledge of AAS and their effects (Pope Jr et al., 2004). As indicated previously, some health professionals have negative stereotypes of AAS users (Yu et al., 2015).

Such mutual mistrust may lead to the avoidance of or delayed access to healthcare as well as denial of AAS use when users come into contact with the healthcare delivery system. This may have dangerous consequences for users such as exacerbation of the potential risks of harms from AAS use, unintended chemical interactions from polypharmacy, medical prescription of medication that may increase the harms of AAS, or AAS-confounding of the health benefits of prescribed drugs (Sagoe et al., 2015). Considering the above dangers, efforts must be put in place to deal with the negative stereotype of AAS users in society in general and among health providers in particular. AAS users must also be encouraged to trust and disclose their AAS use to health professionals in order to ensure efficient and adequate provision of healthcare.

Strengths, limitations, and future directions

As far as we are aware, the present study is the first to examine the effects of perceived source of AAS on how users' personality is construed. Previous SBRPEs have relied largely on undergraduate students (Chantal et al., 2013; Sagoe et al., 2016; Schwerin & Corcoran, 1996; Van Raalte et al., 1993). Our Web-based recruitment of individuals from the general population is an improvement of previous studies.

Our study also has some limitations that should be considered when interpreting our results. First, a large proportion of participants were female. AAS use is largely a male phenomenon (Sagoe et al., 2014), and future studies are encouraged to recruit more male participants. On the other hand, as sexual attractiveness is an important motive for AAS use among males (Sagoe et al., 2014), it could be argued that our preponderantly female sample is desirable from a male-specific prevention perspective. Further, as with any study that uses an observer personality measure, there is a possibility that ratings of the protagonist are influenced by respondents' ratings of their own personalities (Costa et al., 2001).

Moreover, AAS remains prescription medication, and the nuance of prescribed or illicit use in future SBRPEs may contribute further to the present findings. Similarly, as non-medical AAS use is illegal in Norway (Pallesen et al., 2014), future investigations should consider clarifying this or use other methods to investigate the role of legal or illegal AAS use in the perceptual process of observers and users.

Also, considering our finding that females provided significantly higher ratings of the protagonist on neuroticism, openness, and agreeableness, it would be interesting to examine how males and females would rate a female AAS-using protagonist. Future research could also benefit from using an actor perspective where current users who obtain their AAS from different sources provide ratings of the protagonists. Finally, future investigations should consider social norms, respondents' history of AAS use, and cultural and normative factors that may influence perceptions of AAS users.

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