

Psychosocial Factors and Performance Enhancing Substances in Gym Users: A Systematic Review

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Abstract

The use of performance-enhancing substances (PES) occurs among gym/fitness center users. This systematic review aimed to analyze studies describing prevalence, attitudes, beliefs, and knowledge, as conceptualized in the Theory of Planned Behavior (TPB), influenced by the use of PES by this population. Twenty-six articles were identified from a systematic approach following the PRISMA statement via electronic databases (SPORTDiscus™, PubMed, Scopus, Web of Science, B-On and Psychology and Behavioral Science Collection) and hand-searching bibliographies of reference lists. Only peer-reviewed primary research published in English, Portuguese and Spanish (1997-2016), focusing on gym/fitness center users and providing information on psychosocial factors (e.g., attitudes, beliefs, intention, social influence/ peer pressure) towards using PES, were included. It was concluded that the most prevalent substance used were anabolic-androgenic steroids (AAS). Attitudes of male bodybuilders using AAS as the prevalent drug are mainly related to aesthetic issues. Important influences come from groups (e.g., friends, training colleagues) and instructors. Although some AAS users indicated a general lack of knowledge of the potentially harmful effects of these drugs, others were aware of the side effects. The TPB illustrated a relationship between psychosocial factors influencing gym users to use PES.

Keywords: gym users, performance enhancing substances, anabolic-androgenic steroids, theory of planned behavior

According to the American Academy of Pediatrics (2005), “A performance enhancing substance (PES) is any substance taken in non-pharmacologic doses specifically for the purposes of improving physical and sports performance. A substance should be considered performance enhancing if it benefits sports performance / physical activity by increasing strength, power, speed, or endurance (ergogenic) or by altering body weight or body composition. Furthermore, substances that improve performance (e.g., stimulants, anabolic-androgenic steroids (AAS), erythropoietin, human growth hormone, and diuretics) by causing changes in behavior, arousal level, and/or perception of pain should be considered as PES”.

The use of PES, legal or illegal, can occur at all levels of sports (Lollies, 2014; Ntoumanis, Ng, Barkoukis and Backhouse, 2014). A recent systematic review showed that global high prevalence of AAS use is no longer confined to elite competitive bodybuilders and athletes (Brennan, Wells, and Van Hout, 2017).

The very first meta-analysis of the global lifetime prevalence rate of AAS use was conducted by Sagoe, Molde, Andreassen, Torsheim and Pallesen (2014a). They concluded that the overall lifetime prevalence rate across all studies on AAS use was 3.3%, with the prevalence rate for males significantly higher than for females (6.4% and 1.6%,

respectively). In another systematic review and synthesis of qualitative research, it was shown that the majority of AAS users-initiated use before age 30, and negative body image, sports participation and psychological disorders preceded initiation of AAS use for most users. The paramount motives for AAS initiation were appearance, muscle/strength and enhanced sport performance (Sagoe, Andreassen and Pallesen, 2014b). AAS users tend to use a wide range of other licit and illicit substances – polypharmacy, which have potentially serious harmful effects for those engaging in such behaviors (Sagoe, Torsheim, Molde, Andreassen and Pallesen, 2015). Drugs such AAS, stimulants, erythropoietin, human growth hormone, and diuretics have the capacity to impart significant performance enhancing effects, that in the long term use can be associated with several physical disorders, psychological symptoms or even fatal side effects (Baron, Martin and Magd, 2007; Sagoe et al., 2014a).

In spite of numerous studies in the field of doping in sport, there have only been a few attempts of models which could on a theoretical basis explain the factors and the extent of their relevance for reaching the decision to use PES in sport. Furthermore, most of the studies were carried out on samples of professional athletes, whereas recreational athletes were used quite rarely (Mitić and Radovanović,

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2011). In addition to physiological and chemical approaches, anti-doping research should also include sociological, behavioral and ethical studies of athletes' attitudes and beliefs towards the use of banned substances in sport (Morente-Sánchez and Zabala, 2013).

Researchers in this field used social-cognitive and motivational models towards identifying the influential factors on PES use intentions and behavior (Chan et al., 2015). According to Armitage and Conner (2001), the most extensively researched models are the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB). TPB is an extension of the TRA aiming at anticipating volitional and non-volitional behaviors by considering the measures of perceived behavioral control (Armitage and Conner, 2001; Armitage, Conner, Loach, and Willetts, 1999; Goulet, Valois, Buist and Côté, 2010). The model suggested that the behavioral intention (which is the precursor and predictor) of the actions to assume or refuse a healthy behavior (Ajzen, 1991) is determined by the individual's attitude toward the behavior, which reflects (i) "the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question; (ii) subjective norm, it refers to the perceived social pressure to perform or not to perform the behavior; and (iii) perceived behavior control, it refers to the perceived ease or difficulty of performing the behavior and it is assumed to reflect past experience as well as anticipated impediments and obstacles" (Ajzen, 1991, p.188). The TPB has been largely used in doping research to explain athletes' PES use intention and behavior (Chan et al., 2015; Goulet et al., 2010; Ntoumanis, Ng, Barkoukis and Backhouse, 2013; Wiefferink, Detmar, Coumans, Vogels and Paulussen, 2008; Serpa, Faria, Marcelino, Reis, Ramadas, 2003), since the use of PES seems to be largely determined by personal choice (Goulet et al., 2010).

However, according to Barkoukis, Lazuras and Tsorbatzoudis (2016) and Kavussanu and Ring (2017), a number of specific psychological integrative models (Life Cycle Model; Sports Drug Control Model; Theory of Triadic Influence – integrative model in the context of doping and Trans-contextual Model) have been proposed to explain the use of PES in sport, since this is considered, a "multifaceted phenomenon that requires different levels of explanation and understanding of psychosocial processes" (Barkoukis et al., 2016, p.44). According to Lazuras (2016), though different integrative models of doping use include general models of behavioral prediction, such as the TPB (Ajzen, 1991), none of the empirical studies of these models have incorporated measures or analyzed the effects of contextual influence (i.e., sports socioeconomic context and the broader sociocultural context), since it can have a profound effect on action-initiation to PES consumption.

Based on previous research adopting the TPB, specifically a recent meta-analysis by Ntoumanis et al. (2014), that compared and summarized all known psychological

predictors of doping behavior at all performance levels and in all physical settings (Blank, Kopp, Niedermeier, Schnitzer and Schobersberger, 2016), the present systematic narrative literature review has two major objectives. First, to synthesize recent studies that describe the prevalence of PES consumption in gym/fitness center users. Second, to summarize and analyze the psychosocial factors towards using PES in this specific population, according to those conceptualized in the TPB. In this sense, the TPB may contribute to the comprehension of these behaviors and improve the effectiveness of practical interventions, to reduce them among this specific population.

The rationale for this review was to compile the available evidence to conceptualize the psychosocial factors that may influence PES use by gym/fitness center users, since there is a scarcity of existing evidence on this kind of specific population. The TPB (Ajzen, 1991) was adopted, because it is one of the most frequently used models to explain athletes doping intentions and behavior (Chan et al., 2015), it provides definitions and descriptions that are more explicit regarding the specified construct and includes a discriminate validity of the constructs (Armitage and Conner, 2000). In this study and according to the TPB, attitudes, subjective norms and perceived behavior control concern to using PES.

Method

A literature search followed the guidelines from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Moher, Liberati, Tetzlaff and Altman, 2009). Following testing of preliminary search terms, a search strategy was developed (see Figure 1). Searches were conducted in databases of health sciences and electronic platforms including (1997-2016): SPORTDiscus™, PubMed, Scopus, Web of Science, B-On and Psychology and Behavioral Science Collection. In Google Scholar, additional relevant papers were searched. In addition, the reference lists of the included articles that passed the eligibility criteria were hand-searched.

Eligibility Criteria

Only peer-reviewed primary research was included, published in English, Portuguese and Spanish with publication date from the year 1997. Only gym/fitness center users, regardless of age and gender, were included. Studies were required to provide data on psychosocial factors (e.g., attitudes, beliefs, intention, social influence/ peer pressure) towards using PES (see Figure 1).

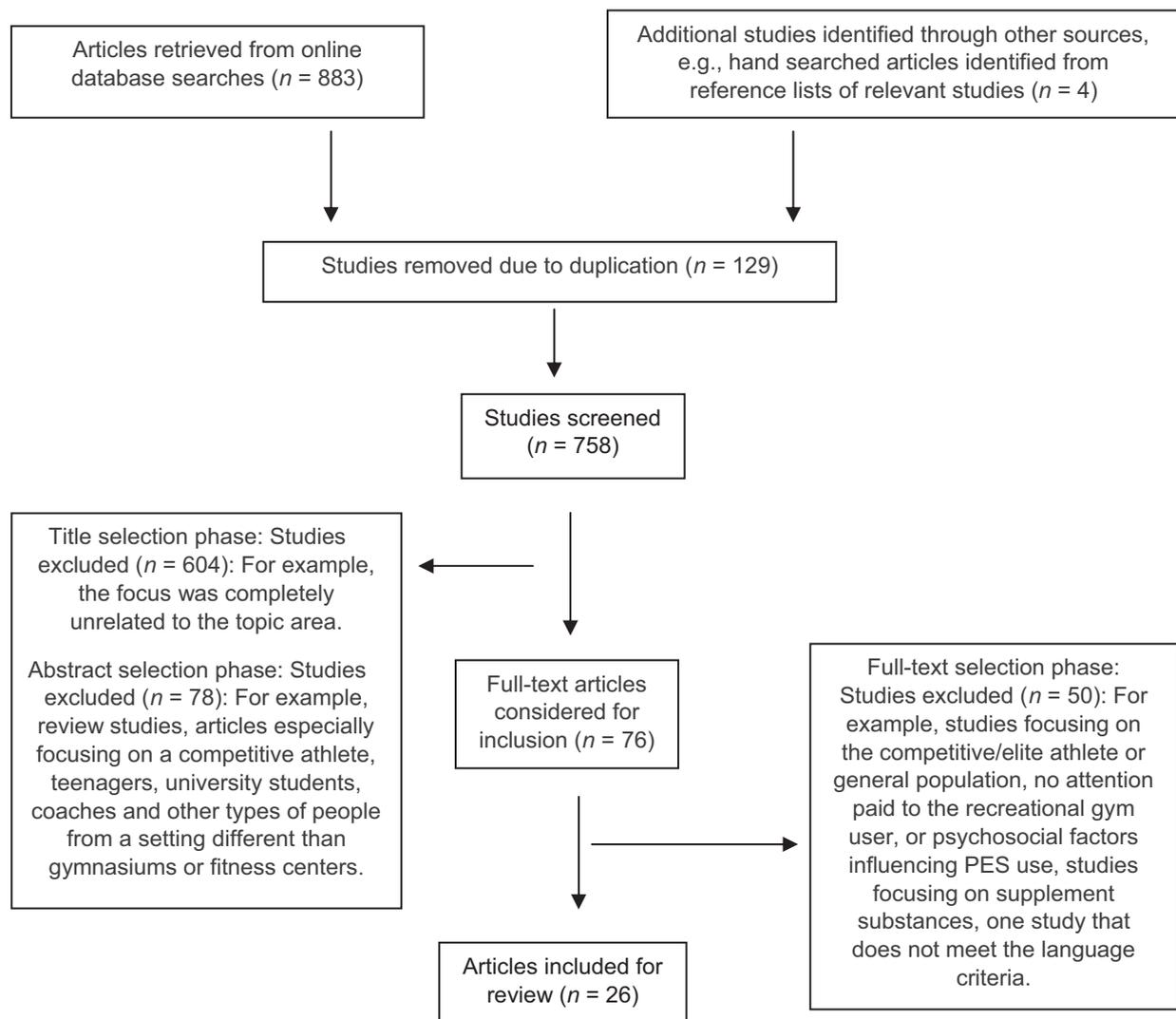


Figure 1. PRISMA diagram outlining the selection process

Data Extraction and Quality Assessment

Important features of each study (“i.e.” year, country, study design, participant, sample size, age group, methodology, risk of bias, key findings and psychosocial factors conceptualized with the TPB – attitudes, subjective norm and perceived behavioral control) were extracted and recorded in Microsoft Excel, which are charted in Tables 1 and 2. The assessment tool developed by Higgins and Altman (2008) was used to evaluate the risk of bias for the majority of individual studies. However, this tool was designed for studies using an experimental design only, so Ntoumanis et al. (2013) created other criteria for cross-sectional studies, which were adopted to evaluate the overall quality of the evidence from this systematic review, since the majority of the analyzed studies were descriptive/cross-sectional. For the qualitative study, the CASP tool (Critical Appraisal Skills Programmer, 2006) was used to evaluate the bias risk. The assessment of all studies was then conducted by two of the authors independently, ratings were compared, and di-

sagreements were resolved by having a third author review the article under question and then coming to a consensus.

Results and Discussion

Summary of the analyzed studies

The main findings are summarized in Table 1 and Table 2. All 26 studies were conducted over a 19-year period (1997-2016), and most of them in Middle Eastern countries (38.46%), followed by Europe (34.61%) and the Americas (26.92%). The sample size ranges from 37 to 7 039, with a total of 21 083 participants across the 26 studies. All the studies compared the gym/fitness center users over a range of different ages. In terms of research design, only Petrocelli, Oberweis, and Petrocelli (2008) used a qualitative approach (grounded theory) and the other 25 were cross-sectional surveys. Methodologies were mainly structured questionnaire, web-based survey, interview (se-

mi-structured, face-to-face, telephone) and observational (with mix interview/questionnaire; observation/questionnaire). The bias risk in the majority of the studies was *Low* (57.4%), according to all assessed criteria used. From the 26 studies included for review, which provided data on psychosocial factors (according to the 3 constructs from the TPB) towards using PES, 24 measured the attitudes; 16 subjective norms and 18 perceived behavioral control.

Key Findings

Prevalence of PES consumption

The most prevalent PES was AAS. The exception was in the study of Stubbe, Chorus, Frank, de Hon, and van der Heijden (2014), in which stimulants to lose weight had the highest prevalence. The prevalence rates of PES use (especially AAS) reported across all of the studies, ranged from the lowest at 4.7% (Pedersen, 2010) and the highest at 70% (Baker, Graham, and Davies, 2006), with the vast majority reporting between 11.1% to 58%. The age of AAS initiation was predominantly adolescence (as low as 16 years) and young adult (under 30 years old). However, in Ip et al. (2015), AAS abuse is prevalent among older males (over 40 years old), showing that although AAS abuse is prevalent in young adults, it is also prevalent in middle aged men, probably due to the motivation to slow the aging process. Findings suggest that the prevalence of AAS is relatively high and a motive for public health concern. It is widespread among the individual countries represented in this study, showing that AAS use initiation occurred predominantly during adolescence and young adulthood.

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Gym / Fitness center users' profile

AAS users were mostly young men, with a low level of education; most were weight trainers, training frequently and along more years (Al-Falasi et al., 2009; Leifman et al., 2011; Pedersen, 2010; Silva and Moreau, 2003; Striegel et al., 2006). Usman et al. (2015) found that misuse of AAS was significantly higher among those with a high level of education, in contrast to the findings of other studies.

Use of other substances, not PES

Some authors suggested that the use of AAS was linked to other substances. For example, in Allahverdipour et al. (2012) consumption of alcoholic drinks and smoking was related to AAS abuse. Silva and Moreau (2003), Nogueira et al. (2014) and Leifman et al. (2011) showed the association with dietary supplements and AAS use. Korkia and Stimson (1997) reported the concomitant use of social drugs. However, Striegel et al. (2006) found that AAS users more often abstain from alcohol in contrast to general illicit drug users (Brennan et al., 2017).

Table 1
General characteristics and summary points

Authors	Year	Country	Study design	Participant	Sample Size	Age Group	Method	Risk of Bias	Prevalence (PES, %)	Key findings
Al-Falasi et al.	2009	United Arab Emirates	Cross-sectional	Males / Females	154	Range: >20; 21-29; 30-39; 33-39; >40	Questionnaire	Low	AAS use (22%)	Misuse was significantly higher among body builders, weight lifters and commercial club users.
Allahverdipour et al.	2012	Iran	Cross-sectional	Males	253	Range: 15-28; Mean=22.2	Questionnaire	Low	AAS use (24.5%)	AAS use related to the consumption of smoking and alcohol drinks.
Alsaeed, I. and Alabkal, J.R.	2015	Kuwait	Cross-sectional	Males	194	Range: 14-19; 20-29; 30-40 ; >40	Questionnaire	Low	AAS use (22.7%)	AAS use was linked with the use of other substances.
Baker et al.	2006	UK	Cross-sectional	Predominantly males	146	Range: 15-72; Mean=33.6	Questionnaire	Potential	AAS use (70%)	The main drugs used by AAS users were Ephedrine (44%), Growth Hormone (24%), Tamoxifen (22%), Clenbuterol (21%), Insulin (14%), Human chorionic gonadotrophin (11%), Diuretics and Thyroid hormone (10% each).
Bojsen-Moller	2010	Denmark	Cross-sectional	Predominantly males	1,398	Range: 11-74; Mean=25	Inquiries submitted by an Internet and telephone-based system	Low	PES use (15%)	While users and those who considered use of WADA-banned substances more often expressed concerns about the health risks associated with their use, users of legal substances did not express it to the same degree.

Authors	Year	Country	Study design	Participant	Sample Size	Age Group	Method	Risk of Bias	Prevalence (PES, %)	Key findings
Grace and Davies	2001	UK	Cross-sectional	Gym users	106	Range: 15-58; Mean=32.4	Questionnaire	Potential	AAS use (58%)	Polypharmacy was evident.
Habeeb et al.	2012	Iraq	Cross-sectional	Bodybuilders	172	Range: <19; 24; 25-29; 30-34; 35-39; 40-44	Questionnaire	Potential	AAS use (44.8%)	Two fifths of AAS users were 19 years old or younger.
Haerinejad et al.	2016	Iran	Cross-sectional	Bodybuilders	453	Range: 16-59; Mean=27.0	Face-to-face interview using a survey	Low	PES use (51.7%)	The most prevalent agents abused PES were AAS (79.4% of participants).
Ip. et al.	2015	USA	Cross-sectional	Strength-trained men	143	Men > / = 40	Web-based survey	Potential	AAS use (46.9%)	AAS abuse is prevalent among the older males which spend more time training and practicing polypharmacy. AAS users were more likely to binge drink and to report a diagnosis of an anxiety disorder.
Ip. et al.	2010	USA	Cross-sectional	Strength-trained subjects	1,519	Range: 16-73; Mean women=32.3; men=29.3	Web-based survey	Potential	AAS use (34.1%)	The majority of male AAS users were recreational exercisers and female AAS users were more likely to have been a competitive bodybuilder. AAS users practiced polypharmacy.
Khullar et al.	2016	Kuwait	Cross-sectional	Males / Females	200	Range: 18-55; Mean=29.1	Questionnaire	Low	AAS use (35%)	Lower age, smoking, and high importance on muscle tone were significant predictors of AAS use.
Korkia and Stimson	1997	Britain	Cross-sectional	Males / Females	1667	Mean women=27.1 men=29.1	Questionnaire / Interviews	Low	AAS use (7.4%)	AAS use was reported in all areas studied. Use of «cocktails» of drugs, blended with the use of social drugs and alcohol.
Leifman et al.	2011	Sweden	Cross-sectional / Observational	Males / Females	2,368	Range: 16-50 +	Questionnaire / Observation study	Potential	AAS use (5.3%)	AAS users were young men, frequent weight trainers and more often drug users. Observation studies could be an alternative to questionnaire in estimating prevalence of AAS use at gyms.
Mohammad H.	2014	Kuwait	Cross-sectional	Males	1,708	Range: 17-35; Mean=19	Questionnaire	Low	AAS use (11.8%)	-
Nogueira et al.	2014	Brazil	Cross-sectional	Bodybuilders	510	Range: 18-57	Questionnaire	Potential	AAS use (20.6%)	Use of AAS was related to the use of dietary supplements.
Pederson	2010	Denmark	Cross-sectional	Danish population / different training milieus	7,039	Range: 15-50	Survey (telephone interviews) and questionnaire	Low	PES use (4.7%)	AAS was the PES most used, except among cyclists (amphetamines).
Petrocelli	2008	USA	Grounded theory	Man weightlifters	37	Range: 19-43	Semi-structured interview	Low	-	Respondents did not demonstrate any anxiety over the possible side-effects.
Razavi et al.	2014	Iran	Cross-sectional	Man bodybuilders	250	Range: 15-45; Mean=25.5	Questionnaire	Low	AAS use (28.8%)	Mainly in adolescent and young adult bodybuilders.
Santos et al.	2011	Brazil	Cross-sectional	Man bodybuilders	123	Range: 18-50	Questionnaire	Potential	AAS use (33.3%)	Bodybuilding practitioners' use and misuse AAS although are aware of the health problems related to the misuse of these drugs.
Silva et al.	2003	Brazil	Cross-sectional	Bodybuilders	209	Range: <20; >40	Questionnaire	Potential	AAS use (19%)	Dietary supplements, as well as other associated drugs, were used.

Authors	Year	Country	Study design	Participant	Sample Size	Age Group	Method	Risk of Bias	Prevalence (PES, %)	Key findings
Silva et al.	2007	Brazil	Cross-sectional	Males / Females	288	Range:13-74; Mean=28.5	Questionnaire applied by interviewers	Low	AAS use (11.1%)	Use of AAS and other hormones and medicines.
Striegel et al.	2006	Germany	Cross-sectional	Males / Females	621	Average age = 33.7	Questionnaire	Low	AAS use (13.5%)	AAS users are physical-achievement-oriented and trained for more years and more frequently than general fitness center members.
Stubbe et al.	2013	Netherlands	Cross-sectional	Males / Females	718	Average age = 43.4	Web-based surveys	Low	PES use (8.2%)	Randomized response technique (RRT) resulted in prevalence differences for the different types of PED. Stimulants to lose weight had the highest prevalence.
Usman et al.	2015	Pakistan	Cross-sectional	Male bodybuilders	310	Range: 15-35	Questionnaire	Potential	AAS use (64%)	Misuse of AAS was significantly higher among those with high level of education.
Wazaify et al.	2014	Jordan	Cross-sectional	Males / Females	353	Range: 12-; >47	Questionnaire	Low	PES use (8.8%)	Use of AAS and other hormones.
Wiefferink et al.	2008	Netherlands	Cross-sectional	Males / Females	144	Range: 14-65; Mean = 32	Questionnaire	Potential	PES use (15%)	Users attribute advantages to PED and are inclined to overlook the risks of using them.

Emergent Themes conceptualized from a Theory of Planned Behavior Perspective

Attitudes towards PES

Most studies concluded that gym/fitness practitioners use PES, especially AAS, for aesthetic reasons, generally driven by their dissatisfaction with physical appearance (53.8%), low self-esteem (3.8%), and the wish to become more attractive and desirable (23.1%). The main motivation for AAS use was to increase muscle mass and strength (46.2%), to improve physical performance (23.1%), to recover faster from previous training sessions (7.7%), to prevent injuries (3.8%) and to manage body size/weight (15.4%) (see Table 2). Thirteen studies (50%) investigated the knowledge of associated risks of AAS use and concluded on a general lack of knowledge or minimization of the potential harmful effects, with no proper attention to the side effects. Based on these findings, it could be argued that this population uses PES, especially AAS, due to a positive attitude towards these substances, in the sense of obtaining the desired results.

Subjective Norms

Gym/fitness center practitioners were influenced to use PES, mainly by their friends (46%), coaches (34.6%) and training colleagues (15.4%) (see Table 2), revealing the high influence of groups and coaches. The standard of beauty

explored by the media (19.2%), aggressive marketing by the industry (3.8%), internet (19.2%), TV advertisement (7.7%), muscle magazines (15.4%) and peer pressure (11.5%) seem to influence and support the use of PES. In this way, perceived social pressure and peers influence on subjective norms should be taken into account when planning preventive strategies, since it may be related with the intention to use PES (Armitage and Conner, 2001).

Perceived Behavioral Control

Most of subjects perceived access to these substances as being easy and bought it from their gym instructors (15.4%), friends (19.2%), internet order/online shopping (23.1%), pharmacy/drugstores (34.6%) or physician/veterinarians (11.5%), without medical prescription, “black market” (19.2%), and clubs/fitness centers (3.8%). Users sought advice and information about the substances from their fitness center instructors (3.8%), physicians (3.8%), training colleagues (7.7%); they studied pertinent literature or received oral information from other users, who described the results from personal experience (7.7%). Santos et al. (2011) concluded that media, magazines and newspapers had an important role in the information about AAS too. The perceived ease of access to this kind of substances and the apparent absence of impediments and obstacle to use it, may favor the PES consumption behavior.

Table 2
Psychosocial factors associated with PES users conceptualized with the Theory of Planned Behavior

Author	Attitude	Subjective norm	Perceived behavioral control
Al-Falasi et al.	Be a stronger athlete and more masculine Have bigger muscles; help win competitions Look physically better	Influenced by friends, media, trainer, health care professional, internet and the fitness magazines	Users obtained AAS from fitness stores, trainers, friends, veterinarians and online shopping
Allahverdi-pour et al.	Increase muscle mass strength Boost performance athletically; look better No proper attention to the side effects of PES consumption	Influenced by their friends and coaches Media and peer pressure	*
Alsaeed, I and Alabkal, JR	Have a muscular body AAS usage is not harmful to health if used correctly	Influenced by friends and coaches	Users obtained AAS from gym coach, individual supplier, pharmacy or physician, internet order and friends
Baker et al.	Predominantly used for cosmetic reasons	Influenced by friends and training colleagues	Users obtained growth hormone particularly by internet order
Bojsen-Moller	Enhanced physical appearance	Aggressive marketing by the industry	*
Grace and Davies	Improve muscle size strength; decrease recovery time from the previous training session Familiar with the medical terms for side effects with AAS use	Influenced by friends and training colleagues	No problem in obtaining AAS; users would stop using AAS if they were shown to cause serious side effects
Habeeb et al.	Enhance athletic performance; increase body size Not aware of the side effects of AAS use	Influenced by coaches, teammates, and friends	Users obtained AAS from retail stores
Haerinejad et al.	Increase muscle mass, endurance and strength; weight gain or loss Improve sport performance and physical appearance Not complete knowledge about the effects of PES before initiation.	Influenced by friends, athlete trainers, Internet and TV advertisements	Users obtained AAS from friends, training partners, gym members, dealers and drug-stores
Ip et al.	Increase muscle mass strength; improve physical appearance "Slow the aging process"	*	*
Ip et al.	Increase muscle mass / strength; improve physical appearance Plans to continue future AAS use despite the experience of some side effects	*	*
Khullar et al.	Ideal muscle tone and definition	*	*
Korkia and Stimson	Increase muscle mass, size and strength; allow harder training Improve bodybuilding, sport performance, recovery from injury	*	Illicit supply networks and manufacture

Author	Attitude	Subjective norm	Perceived behavioral control
Mohammad H.	Improve physical appearance; muscle strength Only for attraction AAS consumption had limited negative impact on health, and a positive effect on physical appearance.	Encouraged by friends and coaches Clubs	«Products available and easy to obtain»
Nogueira et al.	Improve physical appearance AAS use even knowing its side effects	*	Easy access to AAS in veterinary pharmacies or on the “black market”
Pederson	Improve physical performance; to increase/reduce body size	*	Trafficked on the ‘black market’»
Petrocelli et al.	Improve competitive bodybuilder appearance «Get huge»; «get ripped» Motivate by competitive obsession; frustration Be more attractive; more desirable; Not believe that «AAS will hurt them»	Influenced by friends Muscle magazines and TV series	Users obtained AAS from friends, dealers or internet sites
Razavi et al.	*	Recommended by peers, friends, and coaches; Influenced by magazine and internet	Users obtained AAS from pharmacist, black market, supermarkets or by vendors
Santos et al.	Elevate physical development, enhance aesthetics and for personal satisfaction Dissatisfaction with physical appearance; low self-esteem Ignore the side effects	Influenced by training colleagues	Users obtained AAS from drugstores, fitness center, internet or illegal markets; Information obtained from media and fitness center instructors
Silva et al.	Improve physical appearance Adverse effects can be prevented by using other products; medical follow-up helps prevent future illnesses	Standard of beauty, promoted by the media; Lack of control in the marketing of AAS in pharmacies	Users obtained AAS through colleagues or in pharmacies No scientific culture about a better way to use AAS for the intended purpose; Information obtained in documents or by download or orally by other users
Silva et al.	Improve physical appearance and Increase performance; Use of AAS despite the first-hand experience of some side effects	Media and peer pressure	Users obtained veterinary products from veterinary pharmacies or «black market»
Striegel et al.	Body styling Increase strength	*	Users obtained AAS from pharmacist, physicians and dealers; Information about AAS was obtained from physicians, training colleagues and study of pertinent literature
Stubbe et al.	Lose weight Short-term side-effects play a minor role	*	*
Usman et al.	Increase muscle mass/ strength	Influenced by trainers, friends, internet, media, magazines	Users obtained AAS from trainers, friends and online shopping
Wazaify et al.	Increase muscular power	Influenced by friends, internet, and coach	Users obtained medications from pharmacies without a prescription

Author	Attitude	Subjective norm	Perceived behavioral control
Wiefferink et al.	Become more powerful, muscled, better shaped		
	Outcomes would be achieved in a shorter period of time than if they used no drugs at all	*	*

Note. *Not reported

Strengths and limitations

The dominance of research from English speaking countries has skewed findings in the field. Thus, an important contribution of the current study is the multi-lingual approach. Our findings also complement available evidence from quantitative studies in this area, taking into account the target population. However, some limitations must be considered when interpreting our findings. The methodology used within all of the studies – questionnaires – could include people not willing to tell the truth (Peters Schulz and Michna, 2002), even if confidentiality is guaranteed through self-administered and anonymous surveys. Although the TPB provides a framework to understand how psychosocial factors such as attitudes, subjective norms and perceived behavioral control can predict PES use in gym practitioners, caution must be taken, since the studies adopted generalized direct measures of TPB constructs. Chan et al. (2015), stress the importance of indirectly measuring individual's modal salient beliefs in conjunction with direct measures of TPB constructs.

Final remark

Our findings denote the importance of psychosocial factors influencing gym users to take AAS and other types of

PES. The TPB provides a good framework to better understand these behaviors. This theory could be used in future research to provide a template when developing prevention programs to reduce PES use, taking into account interactions between individual factors, performance enhancement motivation, vulnerability to peer pressure, expectations from PES use and behavioral tendencies. In fact, the three main predictive factors for AAS abuse seem to be participant's attitude toward PES use, perceived behavior control and subjective norms (Allahverdipour et al., 2012). The same theory could be used to promote new research trends regarding other groups of gym users besides bodybuilders, as well as different types of PES than AAS, and to expand further the current knowledge to all cultural and geographical areas, in order to deeper understanding this problem. Although TPB provides a good framework, empirical studies and theoretical positions must follow more ecological perspectives, focusing on background variables, such as moral tendencies, motivations and environmental features, since an integrative approach can greatly benefit intervention designers and policymakers on understanding the PES abuse in gym users (Barkoukis et al., 2016).

Factores psicosociales y sustancias que mejoran el rendimiento en usuarios de gimnasios: Una revisión sistemática

Resumen

El uso de sustancias que mejoran el rendimiento (PES) ocurre entre los practicantes de gimnasio / *fitness*. Esta revisión sistemática tuvo como objetivo analizar estudios que describen la prevalencia, las actitudes, las creencias y el conocimiento, de acuerdo con el conceptualizado en la Teoría del Comportamiento Planeado (TPB), influenciado por el uso de PES en esta población. Veintiséis artículos fueron identificados a partir de un enfoque sistemático, utilizando el PRISMA a través de bases de datos electrónicas (*SPORTDiscusTM*, *PubMed*, *Scopus*, *Web of Science*, *B-On and Psychology and Behavioral Science Collection*) e búsquedas manuales de bibliografías a partir de listas de referencia. Sólo los estudios primarios revisados por pares, publicado en inglés, portugués y español (1997-2016), cuya población de estudio fueron la práctica de gimnasia / *fitness* y proporcionar información sobre los factores psicosociales (e.g., actitudes, creencias, intención, influencia social / presión de grupo) para el uso de PES, se incluyeron. Se concluyó que la PES más prevalente eran los esteroides anabolizantes (AAS). Las actitudes positivas ante el consumo de AAS, por parte de los culturistas están relacionadas principalmente con cuestiones estéticas. Importantes influencias provienen de grupos (e.g., amigos, compañeros de entrenamiento) e instructores. Aunque algunos consumidores de AAS indicaban una falta general de conocimiento sobre los efectos potencialmente nocivos de estas drogas, otros estaban conscientes de los efectos colaterales. La TPB demostró una relación entre los factores psicosociales que influyen a los practicantes de gimnasio / *fitness* para usar PES.

Palabras clave: usuarios de gimnasio, sustancias que mejoran el rendimiento, esteroides anabolizantes, teoría del comportamiento planeado

Fatores Psicossociais e Substâncias que Melhoram o Desempenho em Usuários de Ginásio: Uma Revisão Sistemática

Resumo

A utilização de substâncias que melhoram o desempenho (PES) ocorre entre os utilizadores de ginásios e centros de fitness. Esta revisão sistemática teve como objetivo analisar estudos que descrevem prevalências, atitudes, crenças e conhecimentos, conforme o preconizado na Teoria do Comportamento Planeado (TPB), influenciados pela utilização de PES nesta população específica. Vinte e seis artigos foram identificados a partir de uma abordagem sistemática seguindo o método PRISMA através de bases de dados eletrônicas (*SPORTDiscusTM*, *PubMed*, *Scopus*, *Web of Science*, *B-On* e *Psicologia e Behavioral Science Collection*) e pesquisa manual de bibliografia nas listas de referências. Foram apenas incluídos artigos de pesquisa primária revisados por pares e publicados em inglês, português e espanhol (1997-2016), cuja população em estudo fossem utilizadores de ginásios e centros de fitness e fornecessem informações acerca de fatores psicossociais (ex., atitudes, crenças, intenções, influência social / pressão dos colegas) para a utilização de PES. Concluiu-se que as substâncias mais utilizadas foram os esteroides anabólicos androgénicos (EAA). As atitudes dos praticantes de musculação masculinos que utilizam EAA como droga prevalente estão relacionadas principalmente com questões estéticas. Os grupos (ex., amigos, colegas de treino) e instrutores têm uma influência importante na utilização deste tipo de substâncias. Embora alguns utilizadores de EAA indiquem uma falta geral de conhecimento dos efeitos potencialmente prejudiciais dessas substâncias, outros estão cientes dos efeitos colaterais. A TPB permitiu demonstrar que existe uma relação entre os fatores psicossociais que influenciam os utilizadores de ginásios a usar PES.

Palavras-chave: utilizadores de ginásios, substâncias que melhoram o desempenho, esteroides anabólicos androgénicos, teoria do comportamento planeado

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