

Social psychological determinants of the use of performance-enhancing drugs by gym users

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Abstract

The aim of this study is to identify the social psychological determinants of the use of performance-enhancing drugs by gym users who practice bodybuilding, fitness, powerlifting or combat sports. In this questionnaire-based study, 144 respondents answered questions on their actual use and intention to use such drugs and also on their background characteristics and beliefs, such as their attitudes, social influences and self-efficacy. While all social psychological determinants correlated with intention to use these drugs, the most important predictors were personal norms, beliefs about performance outcomes and the perceived behavior of others. Non-users held more restrictive norms about using performance-enhancing drugs, were less optimistic about the performance-enhancing outcomes and believed that fewer significant others used performance-enhancing drugs than users and ex-users. The results of this study indicate that users attribute advantages to performance-enhancing drugs and are inclined to overlook the risks of using them. Preventive interventions should focus on influencing personal norms and social processes.

Introduction

Over the last decade a number of studies have examined the prevalence of gym users' use of performance-enhancing drugs such as anabolic steroids, clenbuterol and growth hormones [1–7]. They indicate that performance-enhancing drugs are used widely ranging from 1–12% among adolescents in an open population, from 3–31% among gym users and from 16–50% among bodybuilders. Given the potential adverse health effects of using such drugs (among them reproductive problems, hepatic dysfunction and testicular atrophy), it is important to develop and implement preventive activities. However, it is currently difficult to specify the most relevant objectives for the development of such interventions, as there is only an incomplete picture of the determinants underlying the use of these drugs [8].

Performance-enhancing drugs are used mainly to improve appearance and to enhance performance in sports [7, 9–11]. The decision to use them is underlain by a number of beliefs and values, some of them about gaining muscular strength and improving performance, and others involving expectations about friends' use of these drugs [9–11]. It has also been indicated that the use of these drugs is related to self-esteem, academic performance, use of other drugs, knowledge of other people who have used them, dissatisfaction with one's own appearance and frequency of gym visits [2, 11–13].

Nonetheless, few studies have used a theoretical framework to examine the full range of determinants related to the use of these drugs in adults. Lucidi *et al.* [10], used the theory of planned behavior to study predictors of intention to use performance-enhancing drugs in adolescents,

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whose behavioral intentions in this respect were significantly predicted by a number of the theory's variables, especially attitude and subjective norms. Although Donovan *et al.* [14] have developed a conceptual framework for modeling the determinants of the use of such drugs—with variables such as benefit appraisal, reference-group influences, personal morality and legitimacy—its predictive power has not yet been verified empirically.

This study was therefore intended to identify proximal social psychological determinants underlying the use of these drugs by adult gym users who practiced bodybuilding, powerlifting, combat sports or fitness (i.e. all exercises whereby some resistance is experienced). The research framework was based on the theory of planned behavior and on Social Cognitive Theory, which describes behavior as a function of intention, and intention, in turn, as a function of attitudes, social influences and self-efficacy [15, 16]. These so-called proximal determinants may themselves be affected by background characteristics such as age, gender, knowledge of performance-enhancing drugs, use of alcohol and other drugs. As performance-enhancing drugs in this study were restricted to 'banned substances', it did not include products such as dietary supplements and vitamins.

Methods

Sample and procedure

To invite gym users in the Netherlands to volunteer for participation in this study, announcements were placed in popular magazines and on Web sites targeting gym users interested in dietary supplements or performance-enhancing drugs. Those on the mailing list of a supplier of dietary supplements were also invited to participate in this study by e-mail. Readers willing to take part gave their address, and were mailed the questionnaire. This was accompanied by a letter explaining the objective of the study that the results would be used for developing preventive activities and that anonymity was guaranteed.

This produced 197 respondents who volunteered to participate, 193 of whom actually returned the

questionnaire (98%). Three questionnaires were not fully completed, and 46 questionnaires were excluded from analysis because respondents did not practice bodybuilding, fitness, powerlifting or combat sports. The remaining 144 were used for analysis.

Questionnaire

As well as being based on the theory of planned behavior and on Social Cognitive Theory [15, 16], the operationalization of the social psychological determinants was based on a review of the literature, which included an earlier study we had conducted among elite athletes (Fig. 1) [17]. In order to make sure that we covered all possible determinants, we also conducted interviews with five gym users, two of whom used performance-enhancing drugs and three of whom did not. We asked them to enumerate all the possible reasons why someone should use these drugs and also why someone should not use them.

Attitude

In this study, we used the term 'attitude' as a heading for evaluative beliefs. These beliefs were divided into four sub-dimensions: (i) improved performance (nine items, Cronbach's $\alpha = 0.89$), (ii) health-compromising effects (seven items, Cronbach's $\alpha = 0.89$), (iii) negative effects on well-being (11 items, Cronbach's $\alpha = 0.81$) and (iv) undesirable changes in appearance (three items, Cronbach's $\alpha = 0.71$). These beliefs were measured as the product of the perceived effects of using performance-enhancing drugs and the importance of these effects to the respondent. Perceived effects were scored on a seven-point scale ['certainly not' (0) to 'certainly' (6)] and subjective importance on a six-point scale. For subjective importance, two scales were used. For advantages of the behavior (i.e. improved performance), the scale ranged from 'not important' (0) to 'most important' (5). For disadvantages of the behavior (i.e. health-compromising effects, negative effects on well-being and undesirable changes in appearance), it ranged from 'very serious' (-5) to 'not serious at all' (0). Each scale followed the statement/question

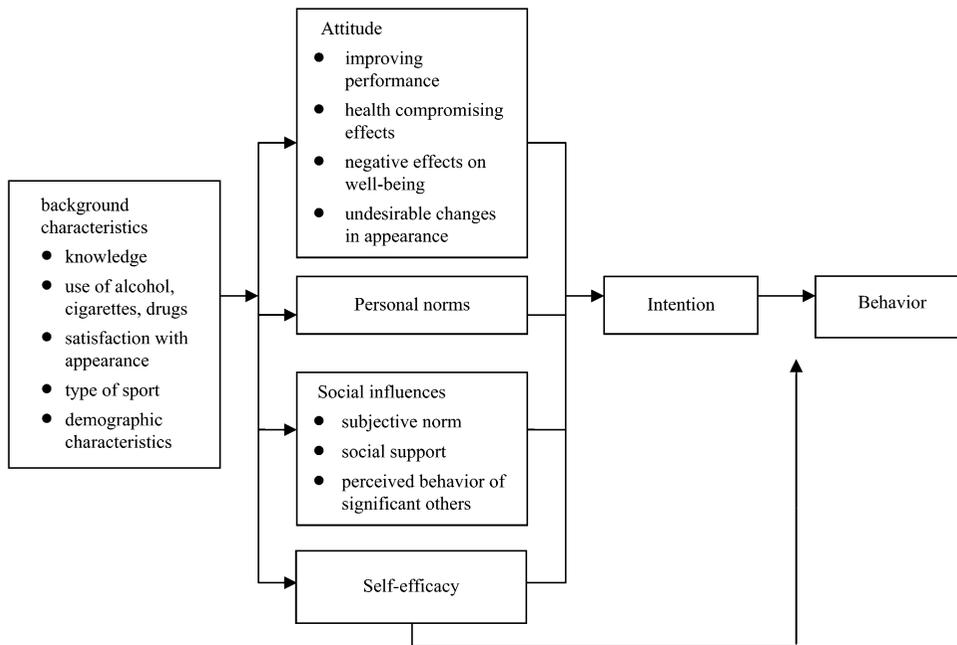


Fig. 1. Theoretical framework.

format. For example, items regarding the improvement of performance outcomes were 'If I use performance-enhancing drugs I will get stronger' and 'How important is it to you to become stronger?' For health-compromising effects, we used items such as 'If I use performance-enhancing drugs, I will have a greater risk of developing cardiac problems' and 'How serious would it be for you to have a greater risk of developing cardiac problems?' For negative effects on well-being, we used items such as 'If I use performance-enhancing drugs, I will sleep badly' and 'How serious is it for you to sleep badly?' For effects on undesirable changes in appearance, we used items such as 'If I use performance-enhancing drugs, I will go bald' and 'How serious would it be for you to go bald?'

Personal norms

Interviews with elite athletes and gym users indicated that personal norms regarding the use of per-

formance-enhancing drugs may have an important bearing on their decision on whether or not to take these drugs. Although the theory of planned behavior does not explicitly include personal norms, Ajzen [16] assumes with regard to behaviors, which are controversial because moral considerations are likely to exist for them, that they may influence intentions, in parallel with attitudes, subjective norms and self-efficacy. Personal norms were assessed on four seven-point scaled items, such as 'People should decide for themselves what they use' [totally agree (1) to totally disagree (7); Cronbach's $\alpha = 0.70$].

Social influences

In this study, social influences are reflected in the subjective norms, social support and perceived behavior of referent groups that gym users identified in the interviews. Subjective norms were assessed by the gym user's perception of the normative beliefs of the gym owner, the instructor and the

other gym users, as well as of friends, training partners and relatives.

We asked the gym users for their perception of how these referent groups would think about them if they used performance-enhancing drugs. Normative beliefs were weighted by the gym users' motivation to comply with these referents, which was assessed in the question concerning the extent to which the gym users cared about the referents' opinion (Cronbach's $\alpha = 0.93$). We used a seven-point scale for both normative beliefs [very negative (-3) to very positive (3)] and for their motivation to comply [none (1) to a lot (7)].

We also used a seven-point scale to assess social support by asking gym users whether they expected these referents to support them in their use of performance-enhancing drugs [certainly not (1) to certainly (7); Cronbach's $\alpha = 0.83$]. To assess perceived behavior by others, we asked respondents how many men and women in their gym they supposed to use performance-enhancing drugs. We also asked the same question with reference to the respondents' male and female friends outside the gym (Cronbach's $\alpha = 0.73$). Similarly, we asked how many of all of these referents they knew certainly to be users of such drugs (Cronbach's $\alpha = 0.85$). Perceived behavior of significant others was assessed on an eight-point scale [nobody (1) to everybody (8)].

Self-efficacy

On the basis of the literature and of the interviews with gym users, self-efficacy was divided into three sub-domains: (i) gym users' self-efficacy in refraining from using performance-enhancing drugs in specific risk situations, (ii) their self-efficacy in acquiring relevant information about the pros and cons of the use of performance-enhancing drugs and (iii) their self-efficacy in contacting a physician for advice and guidance on using performance-enhancing drugs. Self-efficacy was assessed in 10 seven-point-scaled items [very easy (1) to very difficult (7)], such as 'Suppose summer is coming, and you'd like to go to the beach with a well-shaped body. However, your body is not in the shape you

would wish. Would you succeed in not using performance-enhancing drugs?'.

Background characteristics

We assessed some of the gym users' sociodemographic characteristics (e.g. age, gender, education and employment status), their current status regarding the use of other substances (alcohol, cigarettes and other drugs), the type of sport or sports they practiced, the frequency with which they went to the gym and how satisfied they were with various parts of their body (e.g. buttocks, shoulders, legs and stomach; Cronbach's $\alpha = 0.89$). Alcohol use was assessed in the question 'How often did you drink more than 10 glasses of alcohol in one day?'. Substance use was assessed in two ways: 'Did you ever smoke cigarettes?' and 'How many cigarettes do you smoke?'. The same questions were asked for marijuana, ecstasy and cocaine. Satisfaction with appearance was assessed in questions about how satisfied they were with several parts of their body, such as face, shoulders, legs, stomach, etc (Cronbach's $\alpha = 0.89$).

Behavioral intention

We assessed the respondents' intention by asking them which of the eight statements concerning their future use of performance-enhancing drugs would fit them best. These statements were based on Prochaska's theory of change [18], which classifies respondents in stages of change and is underlain by the hypothesis that people move from no motivation through change to internalization of the new behavior. The early stages are defined by the intention to change a behavior in the near or distant future and the later stages being defined by engaging in the new behavior. Four of the eight statements addressed respondents who had never used such drugs, who were asked whether they thought of ever using them and, if so, at what notice (within a month, within 6 months, within a year or never). The other four statements addressed respondents who currently used such drugs, who were asked if they thought they would stop using them and, if so, at what notice.

Current use

Respondents were asked to indicate which performance-enhancing drugs they had used the last time they used such drugs and which they had ever used. The following were listed: anabolic steroids, growth hormone, insulin, clenbuterol, prohormones (of testosterone), drugs against side effects, stimulants, diuretics and thyroid hormone.

Statistical analyses

We recoded the items of the determinant scales such that a higher score showed that the gym user had a greater predisposition toward using drugs. Respondents were divided into three groups: (i) those who never used performance-enhancing drugs (non-users), (ii) those who had used such drugs in the past, but not at present (ex-users) and (iii) those who currently used them (current users). Chi-square tests and Fisher's exact tests were used to assess differences in background characteristics between non-users, ex-users and current users; Pearson's correlation coefficient was used to measure the relationship between determinants' and respondents' intention to use performance-enhancing drugs. Next, because the distribution of scores was skewed, we dichotomized respondents' intention as 'no intention to use' versus 'intention to use'. Thirdly, we modeled the determinants with a significant bivariate correlation with intention by hierarchical logistic regression forward-conditional analyses. Variables were entered according to the order expected in theory: attitude, social influences and self-efficacy in the first step, background characteristics in the second step and past use of performance-enhancing drugs in the third step. Finally, we explored which items of the determinants that entered the equation differentiated best between users, ex-users and non-users, using Scheffe's post hoc test (analysis of variance).

Results

Sample description

Most of the 144 respondents were male (84%). The age range was 14–65 years, with a mean of 32

years. Most respondents were of Dutch origin (90%); the remainder being immigrants from industrialized countries (6%) and from non-industrialized countries (4%). Three-quarters of the respondents who had already left school had finished secondary school or an equivalent. Only 7% of the respondents were unemployed.

Most respondents hardly drank alcohol: 72% never drank or drank less than once a month. However, many respondents reported using other substances: 59% smoked cigarettes, 43% smoked marijuana, 25% used ecstasy and 15% used cocaine. About half of the respondents practiced bodybuilding (49%) and 35% practiced fitness. The remainder either practiced powerlifting (12%) or combat sports (4%). About half (51%) attended the gym four times a week or more. Thirty-seven percent attended two or three times a week and only 12% once a week.

Use of performance-enhancing drugs

About two-thirds of the respondents had never used performance-enhancing drugs, 15% did so currently and 18% had used them but did not do so currently. Most of the respondents who had used them had done so more than once, and most of these intended to use them again in the future. Of all respondents, 29% intended to use them in the future.

With regard to gender, age, educational level and employment status, there were no differences between users, ex-users and non-users. Users and ex-users were more likely to have used the following drugs at least once: marijuana ($\chi^2 = 6.3, P < 0.05$), cocaine ($\chi^2 = 11.7, P < 0.01$) and ecstasy ($\chi^2 = 19.5, P < 0.01$). Similarly, more users and ex-users practiced bodybuilding (66%) than non-users (40%) ($\chi^2 = 14.8, P < 0.05$).

Determinants of performance-enhancing drugs

Table I shows the mean scores for the determinants and the correlation coefficient of these determinants with the intention to use performance-enhancing drugs. With three exceptions (satisfaction with

Table I. Relationship between social psychological determinants and intention to use performance-enhancing drugs in the future (n = 144)

	Mean (SD)	Pearson <i>r</i> with intention
Attitude		
Improved performance (0–30) ^a	13.0 (6.0) ^b	0.59*
Health-compromising effects (-30 to 0)	-14.6 (5.7)	0.47*
Negative effects on well-being (-30 to +30)	-8.3 (4.3)	0.48*
Undesirable changes in appearance (-30 to 0)	-11.7 (6.0)	0.29*
Personal norms (1–7)	3.4 (1.3)	0.67*
Social influences		
Subjective norm (-21 to +21)	-5.7 (5.7)	0.46*
Social support (1–7)	2.6 (1.1)	0.30*
Perceived use by others (1–8)	2.0 (0.8)	0.34*
Certain use by others (1–8)	1.6 (0.9)	0.28*
Self-efficacy		
Self-efficacy in risky situations (1–7)	2.9 (1.4)	0.33*
Self-efficacy in collecting information (1–7)	2.8 (1.7)	-0.07
Self-efficacy in approaching physician (1–7)	4.4 (1.9)	0.12
Background variables		
Satisfaction with appearance (-3 to +3)	1.3 (0.7)	-0.12
Knowledge of performance-enhancing drugs (0–10)	3.1 (1.7)	0.28*
Frequency of visits to gym (1–4)	3.4 (0.7)	0.32*

^aBrackets indicate minimum and maximum scores.

^bThe higher the mean, the more gym users are tempted to use performance-enhancing drugs. **P* < 0.01.

own appearance, self-efficacy regarding the acquisition of relevant information and self-efficacy in contacting a physician), most determinants significantly correlated with intention to use.

Table II shows the results of the logistic regression analysis. Variables were entered according to the order anticipated theoretically: social psychological determinants in the first step, background characteristics in the second step and past use of

Table II. Logistic regression analysis (forward conditional) with intention to use performance-enhancing drugs as dependent variable: odds ratio and 95% CI (n = 125)

	Model 1		Model 3	
	Odds ratio	95% CI	Odds ratio	95% CI
Improved performance	1.26**	1.12–1.43	1.25*	1.07–1.47
Personal norm	3.49**	1.95–6.25	2.46*	1.19–5.10
Perceived use by others	1.86*	1.02–3.39		
Use of performance-enhancing drugs in the past			28.20**	6.21–128.05

Omnibus tests of model coefficients of Model 3: $\chi^2 = 109$, *df* = 4, *P* < 0.001. **P* < 0.05, ***P* < 0.01.

performance-enhancing drugs in the third step. In the first step, three determinants were shown to be significant predictors of intention to use performance-enhancing drugs: personal norms, beliefs about improving performance and perceived use by others (Model 1). The second step showed that two background characteristics—frequency of visits to the gym and knowledge of performance-enhancing drugs—did not contribute to the model, since the same predictors remained in the model as in the first step. After the third step, when past use of performance-enhancing drugs was added, perceived use by others no longer accounted for a unique proportion of variance in intention (Model 3). As shown in Table II, past use of performance-enhancing drugs appeared to be the most important predictor, followed by personal norms and beliefs about improving performance.

Table III shows the differences in mean scores between users, ex-users and non-users with regard to the items that were used for measuring (i) personal norms, (ii) beliefs about improved performance and (iii) perceived use by others. Differences were most apparent between non-users and users and ex-users. Non-users had a more restrictive morality toward using performance-enhancing drugs than users and ex-users. Similarly, non-users were less optimistic than users and

Table III. Differences in mean scores on personal norm, improved performance and perceived use by others; distinguished by users, ex-users and non-users of performance-enhancing drugs (PED)

	Overall <i>F</i>	Users (<i>n</i> = 21)	Ex-users (<i>n</i> = 26)	Non-users (<i>n</i> = 93)	Total (<i>n</i> = 140)
Personal norm (1–7)					
It does not matter how I reach my objective	11.4**	4.9a ^a	4.2a	3.0b	3.5
People should decide for themselves what they use	5.6**	6.3a	5.9ab	5.2b	5.5
I want to reach my goal without using PED	42.1**	2.7a	3.7a	5.9b	5.0
I am proud if I reach my goal without using PED	12.7**	4.7a	5.4a	6.4b	5.9
Total score personal norm	33.9**	4.9a	4.3a	3.0b	3.5
Improving performance (0–30)					
To increase in power	3.3*	17.4a	15.3a	13.0a	14.1
To make training easier	6.5**	11.3a	6.2ab	5.2b	6.3
To gain a target weight	15.2**	18.3a	14.5a	9.3b	11.6
To improve performance	8.5**	21.1a	20.1a	14.9b	16.8
To improve performance quicker	8.0**	13.5a	12.9a	7.3b	9.3
To improve body shape quicker	12.8**	18.2a	17.6a	10.0b	12.7
To gain a muscled body	17.0**	22.7a	21.7a	14.7b	17.2
To gain a well-shaped body	16.4**	23.5a	21.6a	15.6b	17.9
To gain a slim body	5.1**	13.4a	13.3ab	9.1b	10.5
Total score for improving performance	18.7**	17.7a	15.9a	11.1b	13.0
Perceived use by others (1–8)					
Men in their own gym	7.9**	3.8a	3.5a	2.8b	3.1
Women in their own gym	4.1*	2.4a	1.8ab	1.7b	1.8
Men outside the gym	6.9**	2.5a	2.4a	1.6b	1.9
Women outside the gym	1.0	1.5a	1.6a	1.3a	1.4
Total score for perceived use by others	8.3**	2.6a	2.3a	1.7b	2.1

^aSignificant differences between groups are marked with the characters a and b. Groups of the same nature do not differ significantly; groups of different natures differ significantly. * $P < 0.05$, ** $P < 0.01$.

ex-users about the positive effects of these drugs on their performance. Finally, with regard to the number of significant others who were thought to use performance-enhancing drugs, non-users estimated this number to be lower than users and ex-users did.

Discussion

This study shows that most of the determinants included in our framework significantly correlated with the intention to use performance-enhancing drugs. Only three determinants did not: self-efficacy in acquiring information about such drugs, self-efficacy with regard to contacting a physician and satisfaction with physical appearance.

Three social psychological determinants proved to be the most relevant to the intention to use performance-enhancing drugs: personal norms, beliefs

about performance improvement and perceived use by others. With regard to personal norms, the results indicated that users and ex-users generally share the same beliefs about performance-enhancing drugs. Their personal norms about using these drugs were less restricted than those of non-users. Users anticipated more positive effects of these drugs on their performance than non-users. They believed their bodies would become more powerful, more muscled and better shaped. They also believed that these valued outcomes would be achieved in a shorter period of time than if they used no drugs at all.

Similarly, users and ex-users also believed that more significant others used such drugs than non-users did. The use of performance-enhancing drugs did not appear to be a strictly individual choice: the relatively high correlation between personal norms

and subjective norms ($r = 0.51$) might indicate that individuals and their significant others share the same norms concerning the use of performance-enhancing drugs. The relatively high correlation between perceived use by others and subjective norms ($r = 0.34$) probably also explains why 'perceived use by others' was included in the regression model and subjective norms were not, although subjective norms had a higher correlation with intention to use ($r = 0.46$) than with 'perceived use by others' ($r = 0.34$). However, the cross-sectional design of this study does not clarify the extent to which people gradually change their beliefs in accordance with significant others or to which they actively look for other people who hold the same beliefs as they do (i.e. selection). But it is clear that both users and non-users tend to associate with people who hold the same beliefs and show the same behavior as they do themselves.

Past experience of performance-enhancing drugs appeared to be the most powerful predictor. According to Ajzen [16], the relationship between past and future behavior is an indication of the stability of that behavior. This could reflect the influence of habit: when behavior becomes habitual, people no longer plan it, which will therefore be less accurately predicted by determinants of planned behavior. In order to develop preventive activities, it would be useful to know which gym users still plan their use of performance-enhancing drugs and which use these drugs more or less habitually.

Gym users' self-efficacy in resisting the temptation to use performance-enhancing drugs and their knowledge about these drugs did not enter the regression model. For self-efficacy, this is probably because of the correlations between self-efficacy and social influences, which ranged between $r = 0.28$ and $r = 0.30$: respondents who associated with non-users appeared better able to resist the temptation to use these drugs than those who associated with users.

Although our finding of a non-significant association between the gym users' satisfaction with physical appearance and intention to use is in line with the outcomes of an earlier Dutch study [19],

Schwerin *et al.* [12] found that bodybuilders who were more dissatisfied with their body were more likely to use anabolic steroids. One possible explanation of these contrasting findings is that Schwerin's sample consisted of male bodybuilders only, while our sample included three additional sports (i.e. fitness, powerlifting and combat sports). Cultural differences, such as perceived pressure from the media to lose weight or to build muscles, may also account for this discrepancy regarding physical appearance as an antecedent for the use of performance-enhancing drugs. Another possible explanation is that gym users intend to use performance-enhancing drugs when they are not satisfied with their appearance, and that once they have used it and have become satisfied, their intention to use remains positive because they are afraid to lose their better appearance [11]. In that case, satisfaction with appearance will not correlate with intention to use these drugs, as we found in this study.

Although knowledge was correlated with the intention to use drugs ($r = 0.28$), it did not seem to dominate the decision-making process. This corresponds with the findings of Lindstrom *et al.* [1], who also found that knowledge did not affect the use of such drugs. Similarly, other authors found that knowledge did not predict the use of these drugs [5, 20].

Limitations

The results of this study must be considered in the light of its limitations. As we used a convenience sample—i.e. inviting respondents through selected magazines, Web sites and mailing lists—the sample is not representative for all gym users in the Netherlands. This method was used so as to recruit a large enough number of gym users who used performance-enhancing drugs; it is therefore very likely that drug users are overrepresented. This may mean that the prevalence we report overestimates the actual prevalence among all gym users. However, we should point out that the primary aim of our study was not so much to establish the prevalence of the use of these drugs by gym users as to explore the processes underlying such use. Although the

reported prevalence and mean scores are amenable to selection bias, as far as this was systematic, it will not have affected the associations between variables. We have no indication to expect otherwise.

Another potential limitation is the reliance on self-report, which may have resulted in some response bias. Three factors may have worked against such bias: respondents received the questionnaire by mail, there were no identification marks on the questionnaire and they were assured that they would remain anonymous.

While our study showed significant relationships between some determinants, their overall tendency is still not clear. For example, should we regard personal norms as a predictor of the use or non-use of such drugs or as a consequence? Ideally, the causal nature of the relationships we found should be further tested in longitudinal studies.

Theoretical implications

Although it was not our intention to validate either the theory of planned behavior or social cognitive theory, the results indicated the added value of personal norms. While these are not explicitly accounted for by the theory of planned behavior, our study indicates that they are strongly related to the intention to use performance-enhancing drugs. This suggests that personal norms should be included in the theory of planned behavior especially in behaviors that are controversial, such as the use of performance-enhancing drugs. Other studies have also confirmed that personal norms may be as important as attitudes, social influences and self-efficacy [21, 22].

As well as being based on an earlier study conducted among elite athletes, the operationalization of our framework was underlain by review of the literature and individual interviews with gym users. Like Lucidi *et al.* [10], we found that the use of performance-enhancing drugs was predicted by attitudes and social influences. The difference between Lucidi's study and ours is that we asked more detailed questions on these determinants and therefore our results will provide greater focus for prevention programs.

Some determinants we found were congruent with the framework of Donovan *et al.* [14] though others were not. We found some empirical evidence for factors that are also in Donovan's model, e.g. the personal norms, the opinion of significant others and the advantages (benefits) and disadvantages (costs) of using performance-enhancing drugs. The interviews showed, as we had expected, that threats of detection and sanctions are not an issue for gym users. These may be relevant to elite athletes only. Besides, we did not include traits such as self-esteem, as suggested by Donovan *et al.* [14], since, as determinants, these are considered to be more distal to behavior than attitudes, social influences and self-efficacy. As Flay and Petraitis [23] have postulated in their theory of triadic influences, unlike proximal factors, distal factors may be associated with multiple health-related behaviors, but their association with a single behavior will be weaker compared with proximal determinants as accounted for by our framework. We focused mainly on proximal determinants in order to find a maximum of explained variance in the use of performance-enhancing drugs, in determinants that are liable to health education interventions.

Implications for prevention

This study indicates that while users attribute advantages to the use of performance-enhancing drugs, they are also inclined to minimize the risks. Because most current users intend to use these drugs in the future, their use seems to be rather consistent over time. Our study showed that personal norms and perceived use by significant others appeared to be important predictors of use.

Preventive interventions should therefore aim to influence the personal norms and the processes of social influences. In propounding what may prove to be a superior strategy for this, Yesalis and Bahrke [7] states that traditional cognitive approaches should be combined with affective education approaches—focusing, for example, on moral persuasion with strategies that aim at social influences. Mass media and individual approaches can all be used: thus, for example, the message that the use

of performance-enhancing drugs is reprehensible might be spread by posters in gyms. Gym instructors might also be trained in methods for convincing gym users not to use such drugs, learning a range of techniques such as organizing groups of gym users to discuss their own norms or correcting possible misperceptions through dialogue on perceived and real use by others.

Similarly, role models who do not use these drugs could be used to demonstrate or share experiences and to show that various fitness-related objectives can be attained without their use. Such role models might be presented physically in gyms or otherwise in written or audiovisual material. Gym instructors might also be trained in ways to support gym users in attaining goals without drugs.

Nonetheless, because the respondents in this study appeared to be fairly consistent in their drug use, interventions of this sort would probably be more successful in preventing non-users from starting than in convincing existing users to stop. Preventive interventions targeting persistent users should thus also provide the opportunity for harm reduction, possibly by using health tests to monitor and provide feedback on the gym users' health status or by quality control of any drugs they intend to use [7].

Motivational interventions as described above are generally effective for changing cognitions and intentions, but may not be sufficient for changing behavior [24].

Leads for designing preventive interventions aiming at behavioral change might be derived from the concept of implementation intentions [25–27], which are assumed to instigate action initiation by stimulating people to identify specific situations and to agree on the desired behavior ('If I encounter situation X, then I will perform behavior Y'). It has already been shown by Milne *et al.* [26] that a combination of motivational and implementation intentions interventions can have a dramatic effect on health-related behavior. Within the context of this study, one possible implementation intention intervention might consist of offering gym users the opportunity to sign a statement such as 'If someone offers me performance-enhancing drugs, then I would refuse them'.

Conflict of interest statement

None declared.

References

1. Lindstrom M, Nilsson AL, Katzman PL *et al.* Use of anabolic-androgenic steroids among bodybuilders—frequency and attitudes. *J Intern Med* 1990; **227**: 407–11.
2. Vogels T, Brugman E, Coumans B *et al.* Correlates of the use of performance-enhancing drugs among young patrons of gymnasiums in the Netherlands. *Drugs Educ Prev Policy* 1996; **3**: 39–48.
3. Kindlundh AM, Isacson DG, Berglund L *et al.* Factors associated with adolescent use of doping agents: anabolic-androgenic steroids. *Addiction* 1999; **94**: 543–53.
4. Maharaj VR, Dookie T, Mohammed S *et al.* Knowledge, attitudes and practices of anabolic steroid usage among gym users in Trinidad. *West Indian Med J* 2000; **49**: 55–8.
5. Conway L, Morgan D. *Drugs in Sport; the Pressure to Perform*. London: BMA House, 2002.
6. Irving LM, Wall M, Neumark-Sztainer D *et al.* Steroid use among adolescents: findings from project EAT. *J Adolesc Health* 2002; **30**: 243–52.
7. Yesalis CE, Bahrke MS. Doping among adolescent athletes. *Bailliere's Clin Endocrinol Metab* 2000; **14**: 25–35.
8. Laure P. Epidemiologic approach of doping in sport. A review. *J Sports Med Phys Fitness* 1997; **37**: 218–24.
9. Kindlundh AM, Isacson DG, Berglund L *et al.* Doping among high school students in Uppsala, Sweden: a presentation of the attitudes, distribution, side effects, and extent of use. *Scand J Soc Med* 1998; **26**: 71–4.
10. Lucidi F, Grano C, Leone L *et al.* Determinants of the intention to use doping substances: an empirical contribution in a sample of Italian adolescents. *Int J Sport Psychol* 2004; **35**: 133–48.
11. Carfi G, Thompson JK, Ricciardelli L *et al.* Pursuit of muscular ideal: physical and psychological consequences and putative risk factors. *Clin Psychol Rev* 2005; **25**: 215–39.
12. Schwerin MJ, Corcoran KJ, Lafleur BJ *et al.* Psychological predictors of anabolic steroid use: an exploratory study. *J Child Adolesc Subst Abuse* 1997; **6**: 57–68.
13. Kindlundh AM, Hagekull B, Isacson DG *et al.* Adolescent use of anabolic-androgenic steroids and relations to self-reports of social, personality and health aspects. *Eur J Public Health* 2001; **11**: 322–8.
14. Donovan RJ, Egger G, Kapernick V *et al.* A conceptual framework for achieving performance enhancing drug compliance in sport. *Sports Med* 2002; **32**: 269–84.
15. Bandura A. *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs, NJ: Prentice Hall, 1986.
16. Ajzen I. The theory of planned behavior. *Organ Behav Hum Decis Process* 1991; **50**: 179–211.
17. Wiefferink CH, Detmar SB, De Hon O *et al.* *Top sport en doping [Elite Athletes and Doping]*. Capelle aan den IJssel: Netherlands Centre for Doping Affairs, 2003.

18. Prochaska JO, DiClemente CC. Toward a comprehensive model of change. In Miller WR, Heather N (eds). *Treating Addictive Behaviors: Processes of Change. Applied Clinical Psychology*. New York, 1986, 3–27.
19. Vogels T, Brugman E, Coumans B *et al.* *Lijf, sport en middelen; een verkennend onderzoek naar het gebruik van prestatie verhogende middelen bij jonge mensen [Body, Sports and Drugs; a Survey at the Use of Performance-Enhancing Drugs by Adolescents]*. Leiden: TNO, 1994.
20. Anshel MH, Russell KG. Examining athletes' attitudes toward using anabolic steroids and their knowledge of the possible effects. *J Drug Educ* 1997; **27**: 121–45.
21. Schwartz SH. Normative influences on altruism. In Berkowitz L (ed). *Advances in Experimental Social Psychology*. New York: Academic Press, 1977, 221–79.
22. Harland P, Staats H, Wilke HAM. Explaining pro-environmental intention and behavior by personal norms and the theory of planned behavior. *J Appl Soc Psychol* 1999; **29**: 2505–28.
23. Flay BR, Petraitis J. The theory of triadic influence: a new theory of health behavior with implications for preventive interventions. *Adv Med Soc* 1994; **4**: 19–44.
24. Milne S, Sheeran P, Orbell S. Prediction and intervention in health-related behaviour: a meta-analytic review of protection motivation theory. *J Appl Soc Psychol* 2000; **30**: 106–43.
25. Brandstatter V, Lengfelder A, Gollwitzer PM. Implementation intentions and efficient action initiation. *J Pers Soc Psychol* 2001; **81**: 946–60.
26. Milne S, Orbell S, Sheeran P. Combining motivational and volitional interventions to promote exercise participation: protection motivation theory and implementation intentions. *Br J Health Psychol* 2002; **7**: 163–84.
27. Sheeran P, Silverman M. Evaluation of three interventions to promote workplace health and safety: evidence for the utility of implementation intentions. *Soc Sci Med* 2003; **56**: 2153–63.

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