

FEDERAL RESEARCH PROGRAMME ON DRUGS

SUMMARY

PREVPED

**Prevalence and effects of performance-enhancing drugs
in different groups: lessons for a preventive and curative
policy in Belgium**

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Introduction

Performance-enhancing drugs (afterward: PED) can be used to enhance both physical and cognitive performances (see Figure 1). The use is no longer limited to the sport sector and poses a threat to public health. That is why several scientific researches focus on the prevalence, risks, and consequences of PED use in different contexts (e.g. Brennan et al., 2017; Hakansson et al., 2012; Sagoe et al., 2014).

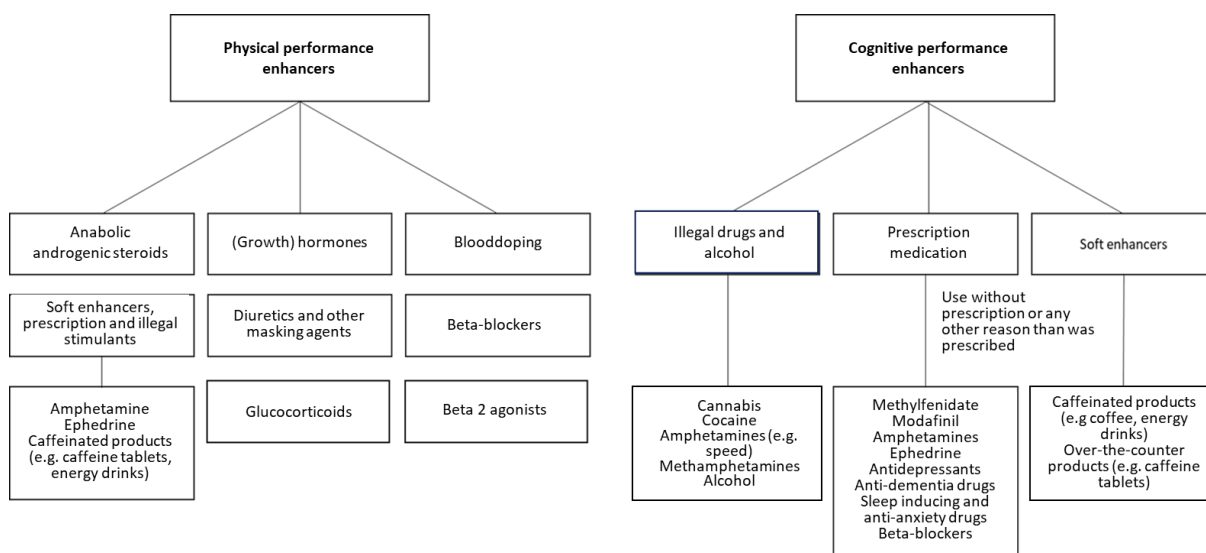


Figure 1. Overview of the different types of performance-enhancing drugs.

This concern is reflected in the policy attention given to the phenomenon. On an international level, this is shown in the measures taken by the United Nations Office on Drugs and Crime (UNODC) to fight against PED (UNODC, 2018). For example, they contributed to the development of prevention and education programs on the use of PED, and in 2008 they set up the Fund for the Elimination of Doping in Sport (UNODC, 2018). However, so far little attention has been paid to PED at a European level. In the drugs strategy that the European Union drew up for 2013-2020, which focuses on reducing the demand for and supply of drugs within the EU and on reducing the health and social risks and harm associated with this drug use (EU, 2012), PED are not mentioned as an explicit topic. Neither did the EU Action Plan on Drugs (2017-2020), which seeks to achieve these objectives in an integrated and evidence-based way. At the Flemish and Belgian levels, there is a global and integrated drugs policy, which focuses, among other things, on obtaining a global insight into all aspects of the drug problem, further developing prevention strategies and optimizing the supply of assistance (Joint Declaration of the Interministerial Conference on Drugs, 2010). PED aren't explicitly mentioned here. However, the battle against drugs is mentioned as a topic for the next legislature in the most recent report of the General Drug Policy Unit (2014-2019). The need for a multi-disciplinary approach will be emphasized, with a focus on the reception of problematic steroid users (General Drugs Policy Unit, 2019).

In addition, there is a large amount of research at the scientific level that has attempted to provide insight into the prevalence, risk factors and consequences of PED use within different settings and populations. In addition to methodological problems (e.g., self-reporting and under-reporting of alcohol and drug use), the extent of non-prescribed use and sales over the Internet makes it difficult to form a good picture of patterns of PED use across countries and settings (EU-OSHA, 2015).

Moreover, to date, no studies have been carried out to investigate the origin of PED on the Belgian market.

Although few studies describing the characteristics of PED users have been carried out in the general population, there are several studies on the use of PED in specific subgroups with an increased risk of use, such as adolescents and students (e.g. Dietz et al., 2018b; Mattila et al., 2009; Papadopoulos et al., 2016). Nevertheless, a significant proportion of PED users are older, and relatively little is known about connected factors ¹with PED use in the general population (Hakansson et al., 2012). Furthermore, the effects of PED both in the short and long term in literature are disputed or unknown (EU-OSHA, 2018). In order to support persons using PED in an efficiently and effectively in their request for help, it is therefore important to form a clear picture of the existing care provision in Belgium. In this way, possible shortcomings can be determined and recommendations can be formulated to deal with the problem of PED use.

That's why this study focuses on analyzing the possible connected factors or potential risk factors of PED use in the general population. In addition, it aims to analyze the effects and motivations of PED users in 3 specific sub-settings, being (1) work, (2) prison, and (3) sports.

The present research aims to answer the following research questions:

1. What is the existing knowledge of PED in Belgium and elsewhere?
 - a) What is the prevalence of PED use?
 - b) What are the effects of PED on the physical and mental health of users?
2. What is the prevalence of non-medical and/or illegal use of PED in Belgium?
3. What are the motives for the use of PED?
4. What is the origin of the products found on the Belgian market?
5. What are the current health care facilities regarding PED in Belgium?
 - a) Are there any striking shortcomings?
 - b) How should these shortcomings be dealt with?
6. What are efficient means to alert users, prevention employees and health care providers to this problem with the aim of better health measures?

The first research question was investigated based on two scoping reviews. The aim was to explore the nature and extent of PED use and to map the motives and effects of PED on the physical and mental health of users (WP1).

The second and third research question was answered using different methods. By means of a representative survey in the city of Ghent, we tried to get a general picture of the prevalence of PED

¹Such as socio-demographic variables, other drug use and the activity level.

in society. In addition, we carried out a survey among fitness practitioners in Belgium. The aim was to get a concrete idea of the prevalence of PED use in a specific sub-setting with an increased risk of PED use, attitudes towards PED use among fitness visitors and their motives for use/non-use of PED (WP2). We investigated these motives in more detail in three specific sub-settings (WP3). For the sub-setting work, a survey was conducted among employees and focus groups were organized with stakeholders from the catering and transport sector. For the sub-setting prison, a survey was also conducted and focus groups among users were carried out. Finally, for the sub-setting sport, both focus groups were held among users and stakeholders for the sports context. In that way, the experiences and opinions of users and stakeholders were retrieved from various settings.

To answer the fourth research question, we conducted an in-depth interview with an expert specialized in drug traffic and drug markets in Belgium. In addition, analyses were carried out on the databases of seizures of postal items by customs, the police and the Federal Agency for Medicines and Health Products (FAMHP). With this, we obtained an overview of the origin of PED on the Belgian market (WP4).

In addition, as an answer to the fifth research question, we examined to what extent the existing care provision (primary care, specialists, care organizations in the alcohol and drug sector) in Flanders, Brussels and, Wallonia has a PED offering and whether there is specific information and care tailored to employees, prisoners and fitness practitioners (WP5). We investigated this by means of a survey among general practitioners and care providers in the alcohol and drug sector, sports doctors, specialists, labor doctors from Internal and External Services for Prevention and Protection at Work and prison doctors.

In the sixth and final part (WP6), recommendations were formulated based on previous research activities to alert users, prevention employees and care providers to the problems of PED use.

The references in this summary can be found in the complete research report.

WP1: Existing knowledge regarding PED use in Belgium and elsewhere

In the first work package, the nature and the scale of PED use are explored, and the motives and effects of PED on the physical and mental health of the users are mapped. We do this by means of two scoping reviews.

1 Scoping review prevalence

1.1 Methodology

A scoping review was executed to study the prevalence of the use of PED. An overview of a broad theme is offered based on a scoping review. The aim is to unite a large amount of knowledge about a certain topic and to map what's already known about the topic and to find out where the gaps in the knowledge are. The summarized information can come from a large variety of sources, such as scientific literature, grey literature or opinions of experts (Peterson, Pearce, Ferguson, & Langford, 2017).

The research question at the basis of this scoping review is the following:

What is the prevalence of the use of performance-enhancing drugs in Belgium and internationally?

The multidisciplinary academic databases PubMed and Web of Science were searched to answer this research question. The used search terms are shown in Figure 1. The inclusion of articles was limited to those published after 2000. Both articles and reviews were included, as long as they were written in or translated to English. Two additional inclusion criteria were that they had to be prevalence studies and that empirical research was carried out. Additional references that seemed valuable for the reception were found by using the snowball method when searching the bibliography of the most important overview articles that were published concerning this theme. In addition, researchers searched for grey literature, such as annual reports of the most important relevant organizations concerned with this theme, such as WADA and NADO. The last research results were found on the 22nd of February 2019 (see Figure 2).

(performance-enhancing drugs OR doping OR cognitive enhancement drugs OR neuroenhancement) AND (prevalence OR epidemiology OR illicit use OR non-medical use) (performance-enhancing drugs AND prevalence) AND (gym OR sports OR fitness OR prison OR work)
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Figure 1. Search strings

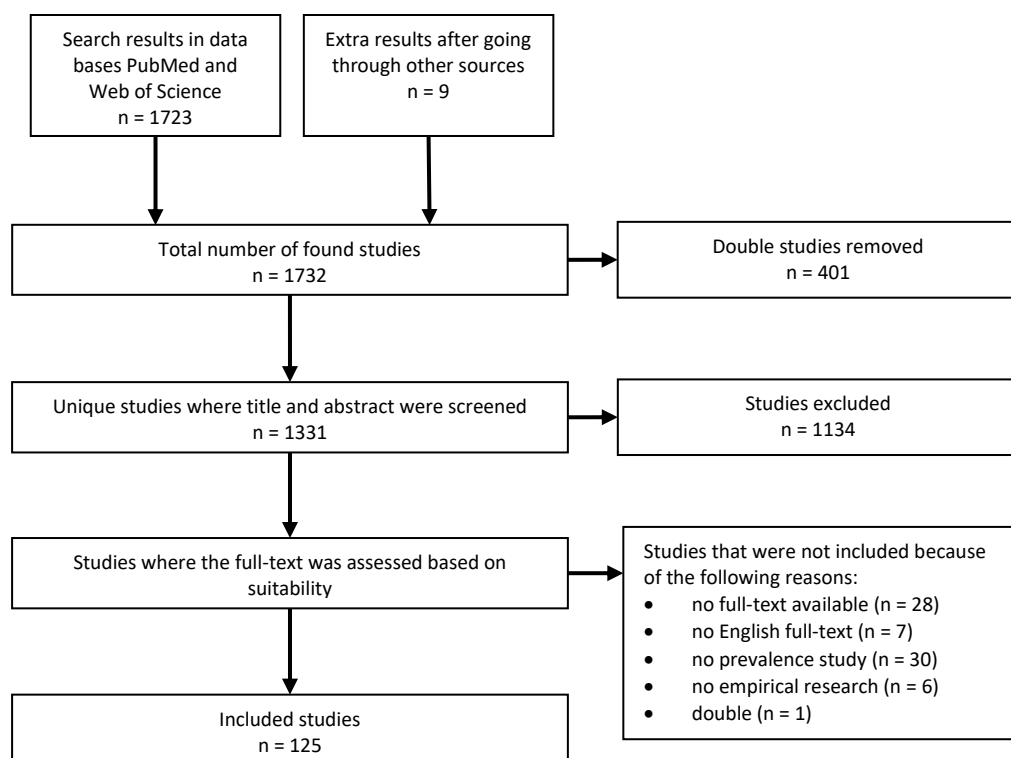


Figure 2. Flowchart of selection process studies.

1.2 Definition

Performance-enhancing drugs or PED are pharmacological drugs that are used to enhance someone's physical or cognitive performances and personal success (Dietz et al. 2013b). Cognitive and physical enhancers can be seen as two sides of the same coin. Both represent the wish to exceed the existing limits of the human functioning or the human capacities temporary or permanently in an artificial way. In literature, there is no consistency regarding the meaning of the term PED. For example, some authors only include physical PED within the definition, referring to the use by athletes or recreational athletes to improve their athletic performance. In the competitive sports world, the term doping is used for this (Pope et al., 2014). Sometimes the terms ergogenic aids (Fрати et al., 2015), appearance and performance-enhancing drugs (APED; Hildebrandt, Varangis, & Lai, 2012) or image and performance-enhancing drugs (IPED; Mooney et al., 2017) are used.

Cognitive performance enhancement can be defined as the use of pharmacological drugs to improve the cognitive functions of healthy people, such as the memory function, attention, creativity, and intelligence, without any medical reason (Fрати et al., 2015). Individuals use neuroenhancement to improve their performances in two ways: on the one hand, drugs are used to improve the cognitive functions (alertness, attention, concentration, memory) and on the other hand, to control the psychological functioning (e.g. mood and sleep) which can indirectly influence the cognitive functions (Maier, Liechti, Herzig, & Schaub, 2013). The literature sometimes speaks of cognitive/brain doping (Dietz et al., 2013b; Franke & Lieb, 2010), smart drugs (Cakic, 2009) or (pharmacological) neuroenhancement (Franke & Lieb, 2010).

1.3 Types of PED

1.3.1 Physical PED

The most discussed and examined type of physical PED are the anabolic-androgenic steroids (further: **AAS**). These are synthetic derivatives of the male sex hormone testosterone and have both an anabolic (muscle building) as an androgenic effect (development of the secondary sexual characteristics in men). They can be taken in pill form, injected or applied to the skin via gels, creams or stickers (Dandoy & Gereige, 2012).

The use of human growth hormones; HGH is also reported because of performance-enhancing reasons. This type of hormones also has an anabolic effect and enlarge the muscle mass while there's a decline of fat mass (Dandoy & Gereige, 2012).

Erythropoietin (EPO), also called a blood booster, became notorious as a performance-enhancing drug that is used especially by cyclists and other endurance athletes. Erythropoietin increases the production of red blood cells and hemoglobin allowing more oxygen to be transported to the muscles (Salamin et al., 2018).

In addition, some sporters also use **stimulants** to stimulate the central nervous system which leads to a higher heart rate and blood pressure. They promote alertness, awareness, and aerobic performance, counteract the feeling of fatigue and prolong the time to exhaustion (Dandoy & Gereige, 2012). Often used stimulants are **caffeine** (mainly in the form of tablets or energy drinks), **cocaine**, **amphetamines**, **ephedrine** and, **pseudo-ephedrine**. The last two are also used to burn more fat (Momaya, Fawal, & Estes, 2015).

Some substances are taken by sporters as masking agents to counteract the detection of PED. **Diuretics**, for example, dilute the urine so that the concentration of other PEDs is below the recognition level in drug tests (Dandoy & Gereige, 2012). At the same time, the muscle relaxant effects of **beta-blockers** can make the abuse of this PED attractive to athletes practicing sports that require balance and agility (Murray & Danaceau, 2009). Furthermore, in addition to these physical enhancers, numerous freely available dietary supplements are taken that fall outside the scope of this study, as these can be used freely both in and out of competitions.

Beta-2 agonists relax the muscles in the airway which makes breathing easier. In addition, the heart rate and metabolism increase allowing the body to provide more energy for a sports performance (Orellana & Márquez, 2011).

Glucocorticoids are derivated from the hormone cortisol and are responsible for an immune response during inflammations. The use of these drugs is only prohibited by WADA for certain methods of administration during competitions (Collomp, Arlettaz, Buisson, Lecoq, & Mongongu, 2016).

1.3.2 Cognitive PED

Some products that are used to treat psychological or medical conditions, can also be used by healthy persons to improve their performances. Besides prescription psychoactive medication (on prescription of the doctor in attendance) such as methylphenidate (e.g. Ritalin) and modafinil (e.g.

Provigil) **illegal drugs** (such as speed and cocaine) and freely available substances such as **caffeine** and **energy drinks** are also taken for this purpose (Schelle et al., 2015).

Drugs that are included in cognitive enhancement studies are often illegal stimulants such as **amphetamines** and **cocaine**, to increase the attention, alertness and, speed, or are prescription stimulants such as **methylphenidate**. In addition, drugs against narcolepsy such as **modafinil** and **medication used for the treatment of dementia** which are memory enhancing, such as glutamate or acetylcholine, are included. **Sleep inducing and anti-anxiety drugs** such as benzodiazepines and **beta-blockers** are also used for performance-enhancing purposes. Finally, alcohol (to combat nervousness, stress, and anxiety), **new psychoactive substances** (NPS) and mood enhancers such as **antidepressants** (because of the relationship between motivation and state of mind and cognitive performance; Brühl & Sahakian, 2016) are also included in this study.

1.4 Results

In total, 125 unique studies were included in the scoping review. 17 of these studies (13.6%) were (systematic) reviews or meta-analyses and 108 (86.4%) studies concerned primary empirical research. The survey method with direct questioning of the respondents was used in 77.8% of the studies. In addition, indirect methods, such as a survey with randomized response techniques (RRT) (11.1%) and doping controls using blood or urine samples (7.4%) were used in 20 studies. In 4 interviews, the respondents were interviewed face-to-face (3.7%).

Eight different types of users could be identified, with the majority of studies carried out among students and adolescents (44.8%) and amateur or professional athletes (37.6%). These studies were executed in 25 different countries, most of them in Germany (16.8%) or the United States (15.2%), or were related to multiple countries (16.8%). Only 3 included studies (3.2%) were executed in a Belgian context.

1.4.1 Prevalence studies in the general population

7 studies were identified with data on the prevalence of performance promotion in the general population, 8 studies synthesizing prevalence studies across settings and 39 and 17 studies on students or adolescents, respectively. 23 studies within this population were exclusively focused on the use of physical enhancers, 41 studies on the use of cognitive enhancers and 4 studies were related to both.

1.4.1.1 Prevalence studies in the general population: physical performance enhancement

The 6 studies that checked the prevalence of physical PED in the general population found prevalence numbers between 0.3% (lifetime; Hakansson, Mickelsson, Wallin, & Berglund, 2012) and 3.3% (lifetime; Sagoe & Pallesen, 2018). A meta-analysis of Brennan, Wells and Van Hout (2017) showed that the use of steroids is a **cross-cultural phenomenon**. Moreover, AAS is **mainly used by men**, although the use of these drugs by women has not been sufficiently studied (Brennan et al., 2017).

Studies assessing the prevalence of physical enhancers in the general population were **mainly focused on student populations** (n = 5) or **adolescents** (n = 12). The prevalence numbers among students were between 2.6% (Papadopoulos, Skalkidis, Parkkari, & Petridou, 2006) and 22.5% (Dietz et al., 2018b) and strongly depended on the used measurement method and the definition of PED. With

adolescents, the numbers in the included studies were between 0.2% (lifetime; Mattila, Parkkari, Laakso, Pihlajamaki, & Rimpela, 2009) and 15.1% (last year; Wanjek, Rosendahl, Strauss, & Gabriel, 2006).

1.4.1.2 Prevalence studies in the general population: cognitive performance enhancement

Studies on the prevalence of cognitive PED concentrated on **subpopulations at high risk** for their use, such as students, and there was even more **variation in the definitions used** to classify these drugs. As a result, prevalence numbers fluctuated sharply: for adolescents they ranged between 1.2% (last year; Koster, de Haan, Bouvy, & Heerdink, 2015) and 54.5% (lifetime; Liakoni, Schaub, Maier, Glauser, & Liechti, 2015) when soft enhancers were also included. In student populations, the numbers ranged between 1.3% (lifetime; Schelle et al., 2013) and 80.1% (lifetime; Hoyte, Albert, & Heard, 2013) when energy drinks were included in the definition. Furthermore, the motivation for the use of PED was not always asked during these studies. This means that these numbers could be higher because the respondents also reported recreational use (Wilens et al., 2008).

1.4.1.2.1 In Belgium

Studies investigating the prevalence of physical or cognitive PED among the general Belgian population are scarce and were only carried out ²in Flanders among students. By doing so, Van Hal et al. (2013) found a lifetime prevalence for stimulants of 6.9% among Flemish students. Furthermore, men scored twice as high on the lifetime prevalence (9.6%) as women (4.8%). In addition, they found that the use was more frequent **during the exam period**.

1.4.2 Prevalence studies in sub-settings

1.4.2.1 Prevalence in a sport environment

The prevalence of physical enhancers in a sports context is not easy to determine. Given the sensitivity of the theme, **differences in athletic background** and **lack of consistent definition of PED**, prevalence rates can also vary considerably within this subsetting. According to the meta-analysis of Sagoe et al. (2014), the use of AAS would be most common among recreational athletes (18.4%), followed by athletes (13.4%) and least common among people who do not exercise.

In the case of professional athletes, **official doping control data** from WADA (World Anti-Doping Agency) and its national counterparts (NADA, National Anti-Doping Agency) indicate that about 1.0% of all tests are positive. This number remained **stable** in the last five years for all countries (WADA, 2017). However, research from Striegel, Ulrich and Simon (2010) showed that these doping controls show an **underestimation** of the prevalence of PED use.

Furthermore, the found prevalence numbers were strongly dependent on the used research method, where studies that used RRT or similar questioning techniques determined a number that is significantly higher than the percentage received using direct questioning. The average prevalence

²A possible explanation of this is that ADHD in Flanders is mainly medicalized, while in Wallonia it's focused on psychotherapy. The prescription of drugs such as ritalin is therefore mainly done in Flanders, resulting in more inappropriate use of these drugs (Finoulst, 2015).

ranged between 3.9% (Schröter et al., 2016) and 57.1% (study among professional athletes; Ulrich et al., 2018) for physical enhancers.

1.4.2.1.1 In Belgium

In Flanders, NADO Flanders carries out doping checks in sports clubs both in competitions and outside of competitions. In Wallonia, these are carried out by ONAD (*Organisation Nationale Anti Dopage*). The last available report of NADO from 2017 showed that the prevalence in competitions in various sports disciplines could be estimated at 3.01%. Outside competitions, this was only 0.1%. In addition, 21.1% of the fitness practitioners tested positive after a doping control (NADO, 2017). In Wallonia, 1342 doping checks were carried out in 2017, with 1.5% testing positive in competitions and 0.01% outside (ONAD, 2017). Other studies that verify the use of physical enhancers in a Belgian context were not found.

1.4.2.2 Prevalence in prison

We only found three empirical studies regarding the prevalence of PED in prisons. These studies have two important limitations: they were all executed in Sweden and the research was limited to asking for the use of AAS. Furthermore, the **motivation for the use wasn't questioned**. So it's likely that recreational use of specific types of PED (such as stimulants and benzodiazepines) were also measured. The found prevalence numbers ranged between 11.5% (Lood et al., 2012) and 55.9% (Klötz et al., 2010).

1.4.2.3 Prevalence in the workplace

To date, the prevalence of cognitive enhancers among the working population has hardly been investigated. 6 studies were included, of which 5 were specifically aimed at one type of occupation. The prevalence numbers ranged between 0.9% (lifetime³; Wiegel, Sattler, Goritz, & Diewald, 2016) and 87.5% (lifetime⁴; Dietz et al., 2016). Again, it should be noticed that the prevalence numbers are strongly dependent on the research design and the chosen definition of PED.

In the Belgian prevalence study on alcohol and drugs among employees, 11.0% of the respondents indicated that they had taken medication for non-medical reasons at some point in the past year. However, the motives for this were not asked. We can't exclude that PED motives were a part of this (Lambrechts, Vandersmissen, & Godderis, 2019).

1.5 Conclusion

Of the 125 studies that were included in this scoping review, it is hard to draw conclusions regarding the average prevalence of PED use. First of all, the big diversity in the used definition of the term PED prevents the comparison of the different study results. Subsequently, studies on the prevalence of PED, both and more specifically on cognitive enhancers, focus on high-risk subpopulations, such as adolescents and students. Only a few studies were found regarding the three specific sub-settings (work, sport, and prison). Furthermore, there was a lack of studies investigating the Belgian population.

³This involved the inappropriate use of prescribed medication.

⁴In this study, the caffeine-containing drinks were included in PED.

With the search terms used, mainly studies were found that verified the use of physical PED in the sports sector. The found prevalence strongly depended on the subpopulations that were surveyed (e.g. bodybuilders, athletes, fitness practicers in general, strength trainers or recreational athletes).

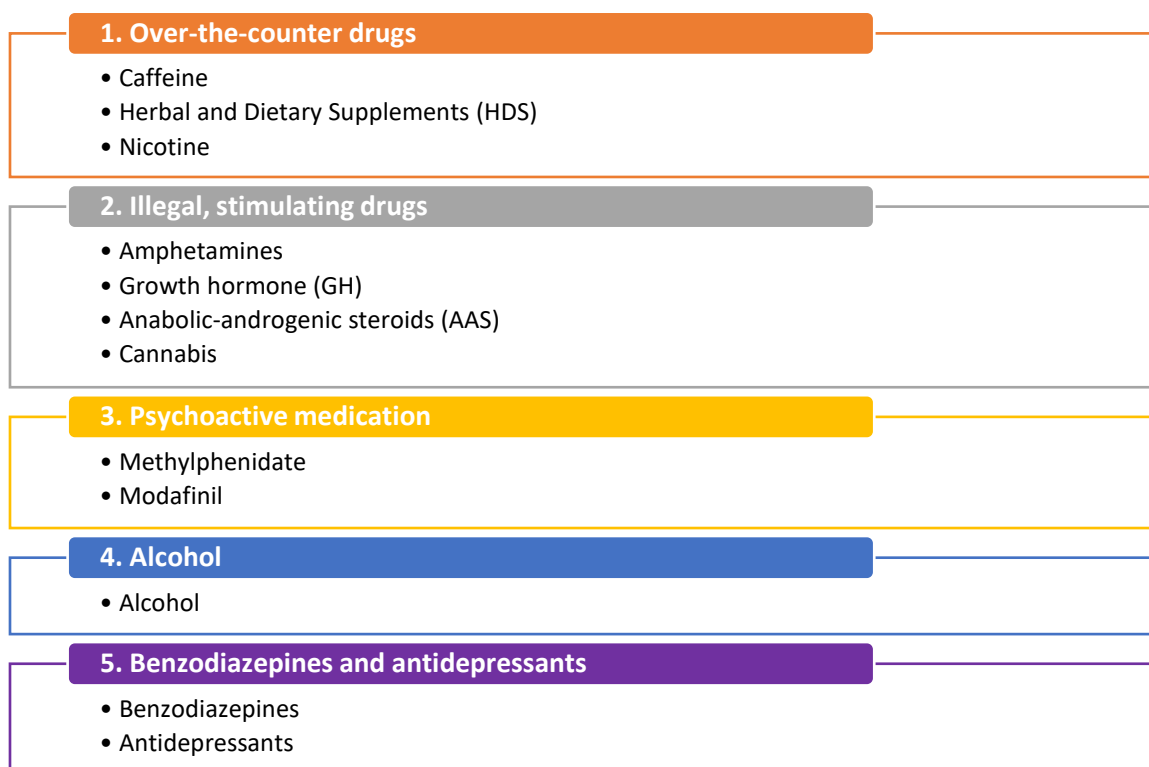
An important remark in the studies discussed is not systematically asking about the underlying motivation for use. So it's very probable that some prevalence numbers are higher because recreational use of PED was also reported. Further research should take the range of drugs that fall under PED into account.

In addition, the high methodological heterogeneity between studies can explain the variability in the prevalence estimations. Studies were conducted both through direct questioning (using a questionnaire or interview) and more indirect methods such as the use of blood and urine tests and randomized response techniques. Studies that compare direct questioning and earlier indirect research methods show that this first method can lead to an underestimation of the prevalence (e.g. Franke et al., 2013). In addition, (official) doping controls could also lead to an underestimation of the prevalence of doping (e.g. Striegel et al., 2010) as masking products can be used (Dandoy & Gereige, 2012). In the literature it is reported that AAS users engage in polypharmacy, often by means of substances that counteract the undesirable side effects of AAS (e.g. Baker et al., 2006; Dodge & Hoagland, 2011; Kanayama & Pope, 2012). Therefore, there is often an overlap between the use of the different PEDs (e.g. Maher, 2008).

Finally, the found prevalence numbers are highly variable not only between countries but also within one region (e.g. Brennan et al., 2017; Maier et al., 2018). Cultural differences and variability in drug policy can play a part in this. So, the use of PED is a cross-cultural phenomenon.

2 Scoping review motives and effects

The following diagram shows an overview of the different categories of PED-drugs discussed in this scoping review. For a detailed overview, we refer to the research report, in which the method of administration and effects, the motives and risks, and the application per setting are discussed for each PED drug - based on the available information. In function of the readability of the summary, only the most recent and/or unique references are mentioned.



2.1 Methodology

In the literature study, as in the prevalence part, the method of ‘scoping review’ was used (Peterson, Pearce, Ferguson, & Langford, 2017). The research question for this study was ‘*Which motives do users of PED have, and what are the motives and risks for use in the work context, in recreational sports or prison?*’. The search terms for the literature search were built up from the different concepts in the research question. The PED concept was, just like the prevalence study, built with Mesh- search terms from the PubMed database of PED drugs from the categories described above. For an effective search, the PED concept was combined with a search string for the setting work, prison, and sport. The separate search string for this setting was built using Mesh-search terms. The search in PubMed and the selection of relevant articles was done separately by two researchers. The selection and the choice of the articles happened afterward after consideration. From the selected articles the relevant information for the literature study was screened and additional articles were added via the references (snowball method). For certain specific PED, such as cannabis and alcohol, extra, relevant literature was searched via PubMed.

2.2 Over-the-counter drugs

2.2.1 Caffeine

The main motives for caffeine use, even at small doses, are of a cognitive nature (increasing attention, vigilance or energy levels) (among others McLellan et al., 2016). But also physical performances are positively influenced by caffeine (e.g. improvement of endurance and muscle strength, which gives athletes the perception of having to make less effort (among others Grgic, Trexler, Lazinica, & Pedisic, 2018).

Although caffeine is relatively harmless when used normally by healthy persons (Glade, 2010), there are *risks* associated with caffeine use. For example, the use of high doses of caffeine can reduce cognitive and physical performance and cause anxiety, nervousness, and insomnia, especially in occasional users (McLellan et al., 2016). The intake of very high doses can lead to caffeine intoxication (Reissig, Strain, & Griffiths, 2009). An overdose of caffeine causes serious psychological and motor problems, such as anxiety attacks or tremors. In addition, it can affect the development of cardiovascular diseases or gastrointestinal problems (among others Guilbeau, 2012).

In the workplace, caffeine is consumed to increase alertness and reduce fatigue. Caffeine use is linked to its availability in the workplace, and to certain professional categories such as nurses and emergency doctors, soldiers and in the transport sector. In addition, the increased alertness due to caffeine consumption results in fewer mistakes or errors and fewer accidents at work (Smith, 2005). In addition, caffeine has a positive effect on the intensity of pain complaints, for example, shoulder and neck complaints (Strom, Roe, & Knardahl, 2012). However, prolonged use of caffeine can cause sleep problems or insomnia, and it is the quality of sleep that suffers most (among others Temple et al., 2018).

In various sports, such as endurance sports or combat sports, caffeine is consumed because of its positive effects on the strength, power, and endurance of the muscles. (among others Clarke, Richardson, Thie, & Taylor, 2018). In addition, the use of caffeine in ball sports can lead to improved overall performances, better sprint capacity and more jumping power. In cycling, however, no effects of caffeine on the anaerobic and oxygen capacity of the muscles were found (Anderson, LeGrand, & McCart, 2018). In addition, caffeine is taken in the form of pre-workout supplements. More research about the effects of these types of supplements in the short and long term is needed.

2.2.2 Herbal and Dietary Supplements

‘Herbal and Dietary Supplements (HDS) are a broad range of more than 80,000 often freely available, ‘plant-based’ products, in the form of vitamins, minerals, dietary products and plant-based preparations (Hassan & Fontana, 2018). Some of these products contain synthetic elements, such as AAS. HDS are being promoted as products that boost health and performance. In addition, the products are being used to boost the metabolism or to lose weight.

Most of these products aren’t tested on their effectiveness or safety, while the use of HDS isn’t without risks (Hassan & Fontana, 2018). Side effects, such as toxic liver diseases, are due to the toxic substances, such as AAS or derivatives of green tea extracts (GTE), which may contain HDS. The use of HDS in the *military* may be linked to the performance-oriented and stressful working environment in the army. *Athletes* can use HDS for the anabolic effect, to improve muscle strength and performances

(also called 'bodybuilding HDS') or to increase their energy or lose weight (so-called 'non-bodybuilding HDS'). In both cases, there's a link between use and toxic liver diseases (Hassan & Fontana, 2018).

2.2.3 Nicotine

Nicotine is mainly smoked, but can also be ingested through 'smokeless' tobacco products such as chewing or snuff (Mundel, 2017). In a meta-analysis, the authors found positive effects on fine motor skills, alertness and accuracy and response time (RT), orientation RT, short-term episodic memory accuracy, and working memory RT (Heishman et al, 2010).

The damage that smoking causes to our health is very big. More than half of the smokers die prematurely from a disease caused by smoking. Furthermore, smoking has a large social impact, e.g. due to the consequences of passive smoking (Mathers & Loncar, 2006). Smokeless tobacco is used in sport for its performance-enhancing effect, to relax, to control weight or to avoid a dry mouth (Mundel, 2017). However, there is little evidence for this.

2.3 Illegal, stimulating drugs

2.3.1 Amphetamines

Amphetamines ('speed') are illegal chemical substances with a strong uplifting and stimulating effect. It is usually snorted in powder form, but can also be taken in pill form, injected or dissolved in a drink. The motives for the use of amphetamines are largely cognitive. Amphetamines have a positive effect on the short term work memory, they improve the 'inhibitory control' or the self-control, and they increase energy and motivation (Ilieva, Hook, & Farah, 2015). The use of amphetamines can lead to a rise in the blood pressure and the heart rate, it can cause fear or confusion, and it has a big risk of dependency and abuse (Bonfond, Tassi, Roge, & Muzet, 2004). Also, the combination with narcotics, for example, benzodiazepines, is risky. Although the combination of amphetamines and narcotics improves sensation, it has a negative effect on alertness (Price, 2017).

In the *work context*, amphetamines can (temporarily) restore and correct the negative effects of sleep deprivation on psychomotor functioning, alertness and risk behavior to the normal, basic level of functioning. Given the significant risks (*supra*), the regular use of amphetamines in the work context is disapproved of (Bonfond et al., 2004). Amphetamines are used in prisons by detainees with ADHD, who supposedly consume these products as self-medication (Young et al., 2017).

Chemsex combines different types of illegal drugs (e.g. crystal meth and GHB, gamma-hydroxybutyric acid), which increase the sex drive. However, there is an increased risk of transmitting HIV and AIDS, or other sexually transmitted infections (McCall et al., 2015; Stuart, 2013). *Chemsex* could also lead to 'losing days', with up to three days of not sleeping or eating, which is harmful to one's health (McCall et al., 2015).

2.3.2 Growth hormone

Growth hormone (GH) is used in *sports* to improve performances or to recover faster after injuries (Birzniece, Nelson, & Ho, 2011). However, GH is illegal and is on the doping list. GH has no positive effect on muscle strength or aerobic sprint capacity in healthy individuals (Hermansen et al, 2017). In young, healthy athletes, the intake of GH can have positive effects on the anaerobic sprint capacity and provides less fat and more fat-free mass (Hermansen et al., 2017). The use of GH can lead to excessive sweating, dizziness, fatigue, fluid accumulation (edema), sensory disorders (tingling or

paraesthesia) and joint pains. When used in large quantities or in combination with other drugs, such as AAS, there is an increased risk of diabetes and heart disease, resulting in higher mortality.

2.3.3 Anabolic-androgenic steroids

Anabolic-androgenic steroids (AAS) are a group of drugs based on the male sex hormone testosterone, with both muscle strengthening (anabolic) and masculinizing (androgenic) effects (Kaynama & Pope Jr, 2018). Both *professional and recreational athletes* use AAS to improve physical performances and physical appearance. Several studies have found positive effects on muscle size and strength and fat-free mass (Heuberger & Cohen, 2019). The use of AAS in sports is illegal and AAS is on the doping list.

The use of AAS has a big risk of dependency and combined drug abuse (e.g. with GH) (among others Grönbladh et al., 2016). In addition, there are adverse consequences on various organ systems, such as cardiovascular, hematological (blood diseases), (neuro)psychiatric (e.g. depression), hormonal, metabolic and liver problems (among others Hassan & Fontana, 2018). *Athletes* who use AAS are also more likely to develop body or eating disorders, such as anorexia or bulimia (Piacentino et al., 2017). In the specific case of female athletes using AAS, its androgenic effect can cause acne, hirsutism (male excess hair in women), voice lowering and menstrual disorders (Huang & Basaria, 2018).

Prisoners take AAS mainly to improve their physical performance and physical appearance (Klotz et al., 2010). Several studies found negative effects of AAS on aggressive behavior (among others Lood et al., 2012). Moreover, the use of AAS by detainees, as in other populations of AAS users, can lead to confusion and forgetfulness, mood swings, depression and even suicide (Klotz et al., 2010).

2.3.4 Cannabis

Cannabis is used by both *elite and recreational athletes* to relax and to suppress stress or anxiety. Its use could contribute to a better concentration and mood (e.g. Huestis et al., 2011), although there is little evidence for this. However, the use of cannabis is illegal and the product is on the doping list. In addition, there is research that indicates that cannabis could be just negative for performance, as it can seriously interfere with cognitive and psychomotor skills (among others Ware et al., 2018). In addition, there are serious risks such as dependence, withdrawal or tolerance, confusion and hallucinations, anxiety disorders, depression and insomnia, dizziness and disorientation. Nevertheless, the precise effects of cannabis on sport performances are unclear and more research is needed (Trinh, Diep, & Robson, 2018).

2.4 Psychoactive medication

2.4.1 Methylphenidate

Methylphenidate is a psychoactive substance, better known under the brand name Rilatrin. It is usually taken as medication in pill form for people with ADHD. However, methylphenidate can also be used improperly as a stimulant via injection or sniffing. Methylphenidate has positive effects on short-term and spatial working memory, it improves inhibitory control or self-control, and ensures faster information processing and increased alertness (among others Ilieva et al., 2015). However, use can lead to insomnia, nervousness, anxiety, and irritation, or can increase the heart rate and cause dizziness or eating problems (Repantis et al., 2010). At very high doses, its use can lead to psychosis, a stroke or a heart attack (Linssen et al., 2014).

Employees, such as shift workers or soldiers, use methylphenidate to deal with sleep deprivation. However, the effects of this are not univocal (Repantis et al., 2010). In prisons, the use of

methylphenidate is mainly reported by detainees with ADHD due to its positive effects on the symptoms (among others Langstrom, Larsson, & Lindefors, 2015). It would also reduce the chance of relapsing into (other) substance abuse (Ginsberg et al., 2015).

2.4.2 Modafinil

Modafinil, a substance similar to methylphenidate, has positive effects on the parts of working memory that are responsible for planning and decision making and improves ‘inhibitory control’ or self-control (among others Battleday & Brem). Modafinil also appears to have a positive effect in case of sleep deprivation (among others Battleday & Brem, 2015), and on the vigilance and attention (among others Flindall et al, 2016). General risks are sleep problems (among others Repantis et al., 2010) and headache (among others Rajaratnam, Howard, & Grunstein, 2013). For people with sleep deprivation, the use of modafinil can also lead to overconfidence or to overestimating one's own performances (Repantis et al., 2010).

Different studies among employees with a lack of sleep confirm the positive effect of modafinil on the cognitive functions and the vigilance (among others Flindall et al., 2016). Furthermore, modafinil can improve attention and self-control (Rajaratnam et al., 2013) and ensure that information is better remembered (Flindall et al., 2016). Nevertheless, the use of modafinil in the work context is linked to risks, such as sleeping problems (Gill et al., 2006; Hart et al., 2006).

2.5 Alcohol

In the case of performance enhancement, alcohol is used in function of pain relief (among others Maisto, & Ditre, 2015). Experiencing pain can lead to alcohol consumption when experiencing negative emotions (Lawton & Simpson, 2009). When consumed in moderation, alcohol can have a positive effect on physical capacity and the quality of life (among others Zale et al., 2015).

The most important *risks* of alcohol use are dependence, and in the case of pain relief, it can lead to chronic symptoms (Zale et al., 2015). Problematic alcohol consumption goes hand in hand with poorer mental health (Salonsalmi et al, 2017). In addition, the combination with other pain killers or opiates can cause serious physical limitations because of the potentiating anesthetic effect. In case of high work pressure, stress or a tolerant social norm regarding alcohol consumption, alcohol is consumed to relax during or after work, or to perform better (among others Giousmpasoglou et al, 2018). Work-related alcohol consumption, on the other hand, can lead to more short-term and long-term absenteeism, or presenteeism (among others Buvik et al, 2018). For employees in the transport sector, problematic alcohol consumption leads to less safe, less responsible and unpredictable behavior, and increases the risk of accidents (among others Bragazzi et al., 2018). In *prisons*, problematic alcohol consumption appears to occur mainly among detainees with ADHD, who presumably consume alcohol as self-medication.

2.6 Benzodiazepines and antidepressants

2.6.1 Benzodiazepines

The main motives for the use of benzodiazepines (benzos) are to combat pain and sleep problems or to combat stress, anxiety, and mood disorders (among others Pandalai, & Schulte, 2017). However, benzos can induce sleepiness and dizziness, reduce the working memory and cause a decline in psychomotor skills, for example by slowing down reaction time or reducing driving skills (e.g. Chou, & Chung, 2018).

Shift-employees take benzos as medication for their sleeping problems (among others Sang et al., 2018). Because of this, they have a higher risk of industrial accidents. For example, they are more likely to fall off a ladder, reduce their driving or machine control skills (Kowalski-McGraw et al., 2017). In addition, the risk of car accidents increases for both older and younger drivers (among others Dassanayake et al., 2011). In addition, benzos reduce overall productivity and slow down the return to work after an absence (Kowalski-McGraw et al., 2017).

Zolpidem, better known under the brand name Stilnoct, is used to sleep or to take qualitative 'naps' to compensate for lack of sleep (among others Caldwell et al., 2009). Shift workers and military personnel use the product, for example, to be able to catch sleep during shifts (among others Lieberman et al., 2013). Possible side effects are dizziness, drowsiness or headaches, hallucinations, depression or mood disorders and memory problems (McBeth et al., 2009).

Prisoners take benzos, such as Zolpidem, because of its positive effects on insomnia, a condition that many prisoners suffer from (among others Hassan et al., 2016). A major risk when used in large doses is aggressive behavior (Lundholm et al., 2013).

2.6.2 Antidepressants

Antidepressants are a group of drugs used primarily in the treatment of depression, but also for anxiety disorders, for example, Sertraline (zoloft), Citalopram (cipramil) or Escitalopram (lexapro). The main motive for the use of antidepressants is to decrease depressive symptoms. Several studies show that antidepressants have positive effects on apathy, pain, energy levels, sleep, life satisfaction and anhedonia (the reduced ability to experience pleasure) (among others Lee et al., 2018). However, the performance-enhancing effect of antidepressants on cognitive functions is minimal, only the substance 'vortioxetine' (the active substance in the antidepressant Brintellix) has shown positive effects (Lee et al., 2018).

The most common side effects are nausea or a dry mouth, weight gain, drowsiness, insomnia or nightmares and anxiety (among others Cappetta et al., 2018). Other possible side effects are less desire to have sex or erectile dysfunction (among others Reichenpfader et al., 2014). In combination with sedatives or alcohol, the use of antidepressants can lead to sedation; in combination with stimulants, blood pressure and heart rate can increase (Hilliard et al., 2013). Abuse of antidepressants in high doses can even lead to a stroke (Hilliard et al., 2013).

Shift-employees use antidepressants for their sleeping problems (Lieberman et al., 2013). On the one hand, use can lead to an improvement of the functioning at the workplace (among others Lee et al., 2018). On the other hand, long-term use of antidepressants increases the risk of workplace accidents, perhaps because in many cases the dose is increased after a few weeks or months of treatment, resulting in stronger pharmacological (e.g. narcotic) effects (Kouvonen et al., 2016). In *prisons*, antidepressants are often prescribed for the treatment of depressions or anxiety disorders (L. Hassan et al., 2016), but there's a big risk of abuse of this type of medication (Hilliard et al., 2013).

2.7 Conclusion

Freely available PED drugs (e.g. caffeine, nicotine) and illegal drugs (e.g. amphetamines, cannabis) are mainly used to improve (cognitive) performance and to increase attention and vigilance. Alcohol, benzodiazepines, and antidepressants - drugs with a narcotic effect - are more likely to be used in the case of performance-enhancement to deal with pain and sleep problems. While the immediate effects of PED use can be seen as positive, there are also numerous risks linked to the use. These risks range

from anxiety and sleep disorders to serious health problems such as heart problems, cancers, liver diseases and dependence on the product in question. These risks increase when several PED drugs are used simultaneously, resulting in unexpected effects. Furthermore, products that are perceived as safe because of their natural origin are not without risk.

A relatively new phenomenon is 'chemsex', in which illegal amphetamine-like substances such as crystal meth and GHB are combined to increase the desire for sex. However, 'chemsex' is also associated with an increase in sexually transmitted diseases, such as HIV and AIDS.

Employees mainly want to improve their cognitive performance or cope with their sleep deprivation. They drink coffee and use stimulants (also without prescription). Employees with variable working hours are mentioned in particular in this context. The use of sleep-inducing medication, sedatives, and alcohol increases the risk of industrial accidents, especially with combined use.

Athletes use PED drugs (especially HDS, growth hormones, and AAS) because of their performance-enhancing effect, to increase their muscle strength and energy, to lose weight, or to recover faster after injuries. However, a lot of these PED drugs are on the doping list.

Prisoners use PED drugs to suppress ADHD symptoms, because of the positive effects on their sleep problems, and to treat depression or anxiety disorders. In addition, they use AAS to improve their physical performances and appearance.

Finally, the effects of various PEDs, especially in the long term, are often still unknown, and additional research is needed in this respect.

WP2: Prevalence in Belgium

In the second work package, the prevalence of PED use in Belgium is studied. In order to get an overview of the prevalence in the general population, we study this on the basis of a representative population survey. In addition, we study the prevalence of PED use in the fitness setting by means of an online survey among fitness practitioners.

1 Representative population survey in Ghent

The data collection for this work package took place within the framework of the Social Capital in Neighborhoods (SCAN) project, in which annual population surveys with structured questionnaires are carried out in neighborhoods in Ghent. This project represents an interuniversity and interdisciplinary collaboration between three research groups: IRCP (Criminological Sciences, UGent), imec-mict (Communication Sciences, UGent) and MIOS (Communication Sciences, UAntwerpen). The first intake of this SCAN study was launched in 2018.

1.1 Methodology

In October and November 2018 the data collection took place on the basis of representative population surveys ($n = 1,753$) within neighborhoods in Ghent with a minimum population of 200 inhabitants. In total, data were collected from 50 different neighborhoods. In terms of population, Ghent is the second-largest merged municipality in Belgium with approximately 260,000 inhabitants in 2018 (City of Ghent, 2018).

For the first intake of the SCAN study, a sample of 40 respondents per neighborhood (50 neighborhoods, $n = 2,000$) was used. The sample was selected on the basis of a sample from the population register and was representative of the composition of the neighborhood in question and stratified by gender (male, female), age (in six categories: 16-24, 25-34, 35-44, 45-54, 55-64, ≥ 65 years old) and nationality (Belgian, not-Belgian).

The population survey was carried out face-to-face on the basis of a Dutch-language structured online questionnaire, drawn up in Qualtrics. This questionnaire was conducted by students of Communication and Criminological Sciences (faculties associated with Ghent University). The questionnaires were conducted during home visits to the selected local residents. The question concerning the use of doping was in writing. More specifically, the following question was asked:

"Have you ever used illegal drugs ('doping') to improve your physical performances? Think of anabolic drugs (such as androgenic anabolic steroids), EPO, peptide hormones (such as growth hormone HGH), et cetera. Note: dietary supplements are not doping."

The respondents could choose from five possible answers: (1) yes, but more than 12 months ago; (2) yes, less than 12 months ago; (3) yes, less than 1 month ago; (4) no, but it's been offered to me; or (5) no.

1.2 Results

Of 1753 respondents, 34 (1.9%) admitted having ever used prohibited substances to improve their physical performances. The prevalence numbers can be found in Table 1. This shows that 67.6% ($n = 23$) of the users are men and 32.4% ($n = 11$) are women.

The largest group of users were between 16 and 24 years of age (23.5%), followed by persons between 35 and 44 years old (20.6%) and 45 and 54 years old (20.6%). Of the 34 users, 31 (91.2%) had the Belgian nationality. Most respondents only graduated from secondary education (41.2%).

Table 1. Prevalence numbers doping use

"Have you ever used illegal drugs ('doping') to improve your physical performances?"	n	%
Yes, more than 12 months ago	19	55.9%
Yes, less than 12 months ago	10	29.4%
Yes, less than 1 month ago	5	14.7%

N = 34

Next, independent t-keys were performed to see if the group that had used PED was different from the group of respondents that had never used PED. The users did not differ significantly from non-users in terms of online and offline risk behavior, nor in terms of becoming victims of online or offline risk behavior. Moreover, no significant difference was found between the two groups in terms of age, gender, nationality or level of education.

2 Survey among fitness practitioners

2.1 Methodology

To get a concrete idea of the prevalence of PED use in subsetting fitness, an online questionnaire was drawn up. In addition to some demographic data of the respondent, this questionnaire looked at the fitness profile, the use of dietary supplements and vitamins, as well as the ever-use and use in the last 12 months of AAS, for both physical performance-enhancing and outwardly-enhancing reasons. In addition, some questions were asked about the respondent's PED network, the potential negative effects of steroid use, and whether the respondent had consulted assistance for this. Finally, the questionnaire was closed with some questions asking about the respondent's doping attitudes. For this the *Performance Enhancement Attitude Scale* was used (PEAS; Petróczi & Aidman, 2009). This consists of 17 theses on doping and was questioned based on a six-point Likert scale, ranging from not at all to complete agreement.

2.1.1 Data collection

Via fitness.be, part of the professional association for the fitness and wellness industry, a letter of introduction was sent to the managers and operators of fitness centers affiliated with this organization. In this letter, operators and managers were asked to distribute the link to the questionnaire either via social media channels, such as the fitness center's Facebook page or via email to their customers. Fitness.be sent a weekly reminder e-mail to the fitness centers to increase the response rate. In addition, the same call was launched on the fitness.be Facebook page among both fitness centers and fitness practitioners so that fitness centers could easily share this message with their members via their own page. Thirdly, a call for participation in the survey was distributed via the fitness.be newsletter.

A Facebook page was also set up for the project itself. Through this page, fitness-related groups were contacted on Facebook with the request to distribute the questionnaire to the members of these groups. However, this call led to little response. Furthermore, a message with a link to the survey was posted on fitness and bodybuilding forums. Finally, the research team itself contacted individual fitness centers by e-mail and asked them to distribute the link to the survey among their member base.

The online questionnaire could be completed from 3 May 2019 until 12 August 2019.

2.2 Results

2.2.1 Demographic characteristics

A total of 1706 respondents were reached, of whom 1685 were Dutch-speaking and only 21 French-speaking. After removing incomplete cases, 1506 respondent data were retained.

Among the participants, 647 (43.0%) were men and 855 (56.8%) were women. 4 persons (0.2%) indicated to identify themselves as gender-neutral. A third (33.0%) of the respondents were between 25 and 34 years old. Almost a fourth was between 18 and 24 years old (22.4%). Most respondents came from the province of East Flanders (511 or 33.9%) or Antwerp (329 or 21.9%). 17.4% or 262 of the respondents lived in Flemish Brabant, 16.9% or 254 from West Flanders, 5.6% or 84 from Limburg and 2.3% or 35 from the Brussels-Capital Region. It should be noted that only 1.9% or 20 of the respondents were residents in Wallonia. When talking about the profile of the Belgian fitness

practitioner, this should be interpreted with caution. These results therefore mainly give a picture of the Flemish fitness practitioner.

849 or 57.1% of the respondents worked full-time. 316 respondents (21.3%) were still studying, while 10.2% (n = 151) were working part-time, 1.4% (n = 21) were looking for work and 1.3% or 19 people soon started working. Finally, 6.2% of the respondents (n = 92) had already retired, 0.2% (n = 3) had given up looking for work and 36 or 2.4% of the respondents indicated that they were in a different work situation.

859 or 58.0% of respondents graduated from higher education, of which 30.2% or 448 respondents graduated from non-university education and 27.8% or 411 from university education. In addition, 8.2% of fitness practitioners (n = 122) obtained a diploma of lower secondary education, while 29.3% (n = 434) obtained a diploma of higher secondary education. Finally, 28 or 1.9% of the respondents obtained a different type of diploma. When these data are compared with the profile of the Belgian fitness practitioner (Borgers & Scheerder, 2018), it should be noted that the study population in this study is higher educated than the average fitness practitioner⁵.

2.2.2 Fitness profile respondents

Besides the demographic data, there were also questions asked regarding the activity level and the body image of the respondents. More than half of the participants (51.8% or 775) worked out 2 or 3 times a week. Almost a fourth (23.3%) of the respondents worked out 4 or 5 times a week.

The most popular fitness activities among the respondents were cardio training with equipment (64.9% or 977) and strength training (62.6% or 943). This was followed by group lessons cardio training (20.4% or 307 persons), group lessons with muscle strengthening (17.9% or 270 persons), CrossFit (13.1% or 197 persons) and relaxation (7.2% or 109 persons). Finally, 7.6% or 114 respondents indicated doing another type of fitness training.

Almost half of the respondents (49.8%) had already more than 3 years of fitness experience and 77.1% trained already more than one year. Moreover, more than half of the participants (56.8%) practiced a sport other than fitness at least once a week. One-fourth of the respondents stated they did this 2 or 3 times a week (25.7%).

The most popular motives for doing fitness were to be physically fit (96.6%), to improve or stay in good health (94.6%) and to improve or maintain appearance (90.4%). When asked about the respondents' satisfaction with their bodies and mental well-being, it turned out that they were satisfied with themselves and most satisfied with their mental well-being.

2.2.3 Use of dietary supplements and vitamins

In the next part of the online survey, respondents were asked whether they had ever voluntarily taken dietary supplements or vitamins for three types of motives: to improve their sports performance, to improve their appearance or to improve their mental well-being.

In total, more than half of the respondents (52.3%) admitted that they had used dietary supplements or vitamins at least once in their lives for one of these three motives. Furthermore, 38.0% of the participants (n = 560) had used these substances at least once to improve their sport performances. In

⁵Research from Borgers and Scheerder (2018) showed that most athletes obtained a diploma of secondary education.

addition, 32.2% of the respondents (n = 476) had used these products at least once in their lives to improve their appearance. When was asked if the respondents had already used these products to improve their mental well-being, 22.5% of the respondents (n = 332) admitted to having done this at least once in their lives.

2.2.4 Use anabolic steroids

Subsequently, the use of AAS was investigated. The concept of AAS was explained as follows: *The term “anabolic steroids” refers to products (hormones) that are similar to the male sex hormone testosterone and can have a muscle-building effect. These drugs can be taken via a pill, injection, a gel, creams or stickers on the skin (eg. Dianabol, Anabol, Sustanon, Proviron, ...)*. The participants were asked about the use of such drugs for two reasons: improving their sports performances or improving their appearance. In total **31 persons** or **2.1%** stated that they had used AAS at least once in their lives to improve their sports performances or their appearance.

27 people or 1.8% indicated that they had ever used AAS to improve their sports performances. 9 persons had used these drugs in the last year (see Table 2).

Table 2. Use of AAS to improve sport performances (n = 1457)

Have you ever voluntarily used anabolic steroids to improve your sports performances?	n	%
No	1430	98.1%
Yes, at least once in my life	18	1.2%
Yes, at least once in the last 12 months	9	0.6%

N = 1457, 49 missings

Furthermore, 27 persons ⁶ (1.9%) admitted that they had ever used AAS to improve their appearance. Here 11 people or 0.7% had used these products even in the last year (see Table 3).

Table 3. Use of AAS to improve appearance (n = 1456)

Have you ever voluntarily used anabolic steroids to improve your appearance?	n	%
No	1429	98.1%
Yes, at least once in my life	16	1.1%
Yes, at least once in the last 12 months	11	0.8%

N = 1456, 50 missings

⁶These were not the same 27 persons who had used AAS to improve their sports performances, but there was an overlap between both groups.

2.2.5 PED-network and information

2.2.5.1 Look for information

In total, 12.4% or 186 of the respondents had ever looked up information about AAS or asked someone else for this information. Of those who had already looked up information, almost half (46.5% of information seekers) did so via the Internet. 15 fitness practitioners used an app, Facebook or Instagram for this (1.0%). 8 persons (0.5%) asked for information via someone in their fitness center and 13 persons (0.9%) asked a sports coach. In addition, 24 fitness practitioners (1.6%) searched for information through a training partner, while 13 people asked a doctor (0.9%). 0.1% or 2 persons asked for information via a pharmacist. Finally, 28 respondents (1.9%) searched for information via another route.

2.2.5.2 Supply

Respondents were then asked how they would like to get AAS. 18.9% or 284 of the respondents would buy these products via the Internet, 10.9% or 164 of the participants would ask his or her sports coach, and 10.5% or 158 people would address someone in his or her fitness center. 4.4% or 66 respondents would ask a training partner, 2.1% or 31 people would surf the Darknet and 1.5% or 23 respondents would look for it via an app, Facebook or Instagram. 53 respondents (3.5%) would buy AAS via another route.

79 of the participants (5.4%) have already been approached to buy or take AAS (see Table 4). Of these, 31 people or 2.1% were approached by someone in his or her fitness center.

Table 4. Whether or not ever approached to buy or take AAS (n=1506)

Have you ever been approached to take or buy anabolic steroids?	n	%
No	1389	92.3%
Yes, by someone in my fitness centre	31	2.1%
Yes, by a sports coach	4	0.3%
Yes, by a training partner	13	0.9%
Yes, by someone via an app, Facebook or Instagram	9	0.6%
Yes, by someone who doesn't go to the fitness	6	0.4%
Yes, by someone else	16	1.1%

N = 1506

2.2.5.3 Use of AAS in the environment

They were then asked whether the respondents knew someone in their environment personally who uses AAS. 269 persons or 18.4% stated that they knew someone who uses AAS. This percentage is considerably higher than the percentage of participants who say they have ever used (2.1%).

2.2.6 Negative consequences and assistance

In the sixth part of the questionnaire, respondents were asked about their experiences with the negative consequences of using AAS and whether they had already made use of some form of assistance.

2.2.6.1 Negative consequences of use

All respondents were asked if they ever experienced negative consequences of the use of AAS. For verification purposes, an answer category was provided in which the respondent could indicate once again that he or she had never used AAS. The majority of the respondents (97.5% or 1404 persons) indicated that they had never used AAS. 20 people or 64.5% said they had never experienced negative consequences. It is possible that a number of respondents were confused and chose this answer category instead of indicating again that they had never used AAS⁷. 5 persons (16.1%) only had experience with negative physical consequences, while 3 persons (9.7%) indicated that they already experienced mental consequences. 22.6% or 7 persons had experience with both physical and mental negative consequences and 1 person (3.2%) indicated that they had not experienced negative consequences due to the use of AAS, but had experienced negative consequences due to other PEDs.

2.2.6.2 Assistance

Subsequently, those persons who did not indicate in the previous question that they had never used AAS or another PED ($n = 36$) were asked whether they had ever consulted a counselor for the possible negative effects they had experienced from their use. 14 persons indicated that they had never done this. 4 persons had sought help because of negative physical consequences and 1 person because of both physical and mental consequences. In addition, 1 respondent had not sought help with negative consequences due to the use of AAS, but due to other PEDs.

Respondents who had experienced negative consequences were asked which counsellor(s) they had consulted. 4 persons consulted their general practitioner and 3 persons consulted a sports doctor. 1 person consulted the pharmacist and 3 persons asked help from a dietician. In addition, 2 persons indicated that they had consulted another counsellor.

2.2.7 Doping attitudes

To gauge the doping-related attitudes of the respondents, the Performance Enhancement Attitude Scale was used (Petróczi & Aidman, 2009). This consists of 17 items in which the respondent indicates on a 6-point Likert scale to what extent he or she agrees with statements ranging from 'don't agree at all' (1) to 'do agree completely' (6). The *cronbach's alpha* shows a good internal consistency ($\alpha = .894$; see Enclosure 2).

The average score on the scale, ranging from 17 to 102, was **29.07** ($SD = 0.54$). Higher scores indicate a more tolerant attitude towards doping, while low scores indicate an intolerant attitude towards doping. The results show that the participants have an intolerant attitude towards doping.

⁷For this reason, the number of respondents who answered as if they had ever used AAS ($n = 35$) by not clicking on the answer category 'never used before' again is higher than the number of respondents who said they had used AAS in the previous section ($n = 31$).

In addition, the difference in doping attitudes between certain groups of participants was investigated by means of independent t-tests. It was found that men ($M = 33.11$, $SD = 15.35$) have a more positive attitude towards the use of doping than women ($M = 25.19$, $SD = 8.95$); $t = -7.621$, $p < .001$.

Moreover, persons who admitted to having taken vitamins or dietary supplements at least once in their lives ($M = 32.15$, $SD = 14.99$) were also found to be more tolerant of doping than persons who had not yet done so ($M = 27.15$, $SD = 11.39$); $t = 4.315$, $p < .001$. The same was found when comparing the group of AAS users ($M = 49.68$, $SD = 24.02$) with the group of non-users ($M = 28.77$, $SD = 11.83$); $t = 4.161$, $p < .001$.

2.2.8 The steroids user

In the next section, the characteristics of the AAS users will be discussed in more detail. As the group of users is very small, the following data should be interpreted with caution.

2.2.8.1 Demographic data

A total of 31 participants, including 25 men and 6 women, indicated that they had used AAS at least once in their lives to improve their appearance or sports performances. Using a one-way ANOVA test, it was shown that men on average use AAS more than women when compared to the group of non-users ($F = 18.43$, $p < .001$).

In addition, at least one user was identified in each age category. 3 respondents were younger than 18 years old, 4 were between 18 and 24, 7 between 25 and 34, 8 between 35 and 44 and 5 were between 55 and 65 years old. 1 respondent was older than 65. There was no significant connection found with the age of the users.

Most users worked full-time ($n = 19$). 4 persons worked part-time, 1 person was looking for a job, 4 persons were students and 2 others were already retired. 1 person didn't answer this question.

19 of the users obtained a secondary education diploma while 10 users obtained a higher education diploma. 1 person obtained another type of diploma and another AAS user obtained a diploma from primary education. Based on a one-way ANOVA test, it was established that users have an average lower level of education when compared to the group of non-users ($F = 8.45^{**}$, $p < .05$).

2.2.8.2 Fitness profile

More than half of the users ($n = 16$) trained 4 or 5 times a week. 3 respondents trained once a week, 10 respondents trained 2 or 3 times a week and 1 respondent trained 6 or 7 times a week. No significant difference in the frequency of workouts between the group of users and the group of non-users was found.

In addition, two-thirds of the users had more than three years of experience with fitness. Again, no significant difference in experience between the group of users and non-users was found.

Of the 31 users, 24 did strength training and 12 did cardio training with equipment. When this was compared with the group of non-users, it was found that there is a significant difference between these

two groups in terms of cardio training ($F = 9,556$, $p < .05$). AAS users do less cardio training than the group of non-users.

In addition, 5 users made use of personal guidance in their fitness centre. 22 other fitness practitioners indicated that this was possible within their fitness centre, but that they did not train under personal supervision. 3 steroid users stated that this was not possible within their fitness centre and one person was unaware of this.

When looking at participating in other sports activities, it was found that 11 AAS users never participate in any other sport outside fitness. It could be shown that users participate significantly less frequently in other sports than the group of non-users ($F = 4.31$, $p < .05$).

2.2.8.3 Motives for fitness training

Of those who had taken steroids, 90.3% did fitness to improve their health or stay in good health, 87.1% did fitness training to be physically fit and 87.1% also trained to improve or maintain their appearance. Although these are the same most popular motives as those of the entire group of respondents (both non-users and users), some significant differences in motives were found between users and non-users. For example, users of AAS would exercise less with the motive to be physically fit ($F = 13,971$, $p < .001$), as well as less to have fun ($F = 8,888$, $p < .005$) or to resist their thoughts or feel good in their head ($F = 4,931$, $p < .005$) when compared to the motives of non-users. When asked about the respondents' satisfaction with their bodies and mental well-being, it turned out that they were satisfied with themselves and most satisfied with their mental well-being. They were no different from the group of non-users.

2.3 Conclusion

Using a representative population survey, the *lifetime* prevalence of PED use was investigated. It was found that 1.9% of the respondents had ever used these drugs. This is in line with what is established in the international literature when researchers make use of direct questioning (e.g. Hakansson et al., 2012, Sagoe & Pallesen, 2018). These results cannot be generalized to the entire Belgian population but nevertheless, show a first indication.

When looking at the sub-setting fitness, in which, according to the literature, the risk of using PED is increased, a prevalence number of 2.1% is again found. It should be noted that in the population survey a larger group of PED was asked for, whereas in the fitness setting only the use of anabolic steroids was asked for. The fact that only the use of anabolic steroids was investigated is a limitation of the research conducted. The literature mentions that the use of stimulants among fitness practitioners (i.e. to lose weight) is gaining popularity (e.g. Stubbe et al., 2013). However, the found prevalence number is in line with what was found in previous research (e.g. Leifman et al., 2011; Stubbe et al., 2013). Further research into the prevalence of PED in the Belgian fitness setting, therefore, best investigates the use of other types of PED in addition to the use of AAS.

An important observation is the very limited response from French-speaking fitness practitioners. On the one hand, the French-speaking fitness associations were not prepared to distribute the online questionnaire to their fitness clubs. On the other hand, no French-speaking fitness practitioners were reached via other channels such as Facebook. Moreover, the link to the questionnaire was not distributed via French-speaking fitness forums. These results therefore mainly give a picture of the Flemish fitness practitioner.

When the respondents in the current survey are compared to the Belgian fitness participants (Scheerder, 2018), it is found that the respondents in this survey have the same demographic characteristics, but have a higher level of education. In addition, more than half of the respondents participate in a sport other than fitness at least once a week, which may indicate that they are especially doing fitness training to perform better in their sport.

It is noteworthy that more than half of the respondents had already used vitamins or dietary supplements to enhance their physical performance, enhance their appearance or promote mental well-being. In previous research, researchers already found evidence for the link (i.e. indirect) between the use of such substances and the use of illegal PED at a later date (see among others Hildebrandt, Harty, & Langenbucher, 2012).

The persons who had already used steroids were mainly men, which was also found in WP1 in the scoping review (e.g. Brennan et al., 2017). Moreover, they trained less to improve their physical performance, have fun or feel better. This could indicate the importance of the motive to improve appearance through the use of anabolic steroids, rather than promoting athletic performances.

Moreover, it was found that steroid users did not have more experience in fitness training or trained more often than non-users, but they did participate less in other sports outside fitness. This group, therefore, trains less to improve their sports performances within another sport, but rather for the reported appearance-enhancing motives.

WP3: Motives for PED use

In the third work package, the motives for the use of PED in three settings are discussed in more detail: at work, in the fitness center and, in detention.

1 Subsetting work

In this part of the study, we examined the motives of PED use by employees from the transport and the hotel and catering sector. We first looked at the extent of PED use, and then at employees' motives to use PED. Finally, we also took stock of the *opinions of stakeholders (1.2)*. Quotes can be found in the detailed research report.

1.1 Survey employees

1.1.1 Methodology

In order to reach employees from the transport and the hotel and catering sector, we contacted the main public transport organizations, as well as the representative employers' and employees' organizations of both sectors. We also sent the links to Facebook groups whose members were transport and hotel and catering employees respectively.

With a short questionnaire (3 questions) we surveyed the extent of the use of the following substances: caffeinated drinks, food supplements and/or vitamins, alcohol, cannabis, other illegal substances, stimulants, sleep-inducing and sedatives/antidepressants and anabolic androgenic steroids (AAS).

In the case of a positive answer, the *motives of use* were examined, also for each substance. Multiple answers (motives) per substance or product were possible. By means of an open question, the respondents also had the opportunity to formulate comments on the use of (certain) PED substances, or on their prevention and approach. Finally, some profile questions (e.g. gender, age) were asked for further analysis.

1.1.2 Results transport sector

The survey for the transport sector was opened 540 times, 414 were useful for analysis.

1.1.2.1 Profile respondents

Of the 339 respondents who filled in the survey completely, 269 were men (79.4%) and 70 were women (20.6%), largely Dutch-speaking (88.2%). The average age of the participating transport employees was 46. Most transport employees worked mainly during the day (62.5%) and week (71.4%). Just over a quarter of the transport employees worked both during the week and during the weekend.

1.1.2.2 Frequency of substance use

Caffeinated drinks were the most consumed: 86.4% of the transport employees indicated that they used caffeine at least weekly, of which 75.1% daily. Alcohol was the second most used substance and 61.9% drank alcohol at least 2 to 4 times a month. Of this group, 40.6% drank alcohol at least once a week.

Food supplements and/or vitamins were taken by 22.3% of transport employees at least 2 to 4 times a month, of which 13.8% daily. Finally, 9.5% of the respondents indicated that they *took sleeping pills, sedatives and antidepressants* at least 2 to 4 times a month, of which 5.6% used them daily.

The other resources surveyed were used less by transport employees: 13.0% ever used *cannabis*, of which 3.4% in the last year. The ever-use of *other illegal drugs*, such as XTC, was 7.0%, of which 1.9% during the past year. Stimulating drugs (e.g. Rilatin), were ever used by 2.7% of the respondents (0.7% in the last year). Finally, the ever-use of AAS was 1.9%.

1.1.2.3 Motives for drug use

Caffeine-containing drinks were consumed the most by transport workers for social reasons (19.9%) and out of habit or dependence (31.6%). A large number of respondents indicated that they also consumed caffeine 'for another reason' (32.9%), e.g. because they liked it.

Food supplements and/or vitamins were mainly used for physical reasons: to deal with physical complaints (35.6%) or to function better physically at work (20.6%). Other reasons were for improving health or for medical reasons (26.3%).

Alcohol was mainly drunk for social reasons (60.7% of the respondents). Specifically for alcohol, respondents relatively often (26.9%) indicated an extra reason. Usually, it was about the taste or because it's tasty. *Cannabis* (55.6%) and *other illegal substances* (55.2%) were also used mainly for social reasons.

Transport employees used *stimulating medication* (n=11) to function better cognitively (45.5%) or physically (27.3%) at work. *Sleeping pill, sedatives or antidepressants* were also used to improve cognitive (9.9%) or physical (11.1%) functioning at work, but mainly to deal with mental (25.9%) or physical complaints (30.9%). The limited number of transport workers (n=8) who once used AAS did so to function better cognitively and physically at work, or to deal with physical complaints.

When the distinction was made between social (non-PED) motives (e.g. 'out of habit') or PED motives (e.g. to function better mentally or physically at work), caffeinated drinks and alcohol were found to be mainly used for social motives. On the other hand, food supplements, sleeping pills, sedatives or antidepressants were used mainly because of PED motives.

Around 70 respondents filled in the open question. Respondents, for example, were in favor of more control/zero tolerance and questioned coffee as a PED agent.

1.1.3 Results hotel and catering industry

Due to the low number of respondents (n=39), no results could be drawn.

1.2 Focus group stakeholders transport sector

1.2.1 Methodology

Both employers' and employees' umbrella organizations from the transport sector, as well as traffic and breakdown service organizations, were contacted by e-mail and/or telephone. An important part of the transport sector was present with this.

We made use of a semi-structured interview guide with key questions, more specifically about the definition of PED drugs; the extent and frequency of use by employees in the transport sector; possible problems due to PED use (at individual, organizational and community level); interventions for approach and support needs in that respect.

1.2.2 Results

1.2.2.1 Definition of PED drugs

Roughly speaking, a distinction was made between stimulants and narcotics. Commonly, the use was defined in order to 'perform better'. Medicines were considered to be PED when their use had an effect on the behavior and on the concentration of the user. It was also indicated that the characteristics of the product (e.g. tolerance) had an influence.

According to the participants, the motive of use determined its PED character. The legal or non-legal status of the drug played no role in this. The following motives for PED use were mentioned: time pressure, stress, changing working hours, and to prevent withdrawal symptoms.

1.2.2.2 Scale of use

All those present indicated that according to them PED resources were apparently more present and/or used by employees in recent years. However, they had no idea to *what extent*, and they had little information about it. Questions were also asked about the *origin* of the drugs.

The participants observed an *evolution* in the use of drugs, apart from the PED motive. The general finding was that most young workers thought it was perfectly normal to use cannabis. Other illegal drugs, such as heroin and cocaine, were hardly encountered, perhaps because daily life is dominated by that type of drug, and work is therefore no longer possible. The use of such drugs in combination with traffic also seemed unlikely to them. According to those present, the company culture had also evolved in terms of the use of drugs. Finally, the availability of certain substances (e.g. energy drinks) played a role in the extent of use.

1.2.2.3 Consequences of use

The participants indicated that in addition to poorer results and deteriorating labor relations, the *risks* for the driver himself and his environment can be enormous. Extensive consideration was given to *the loss of image* for the sector. According to those present, the sector's loss of image also involved the *stigmatization* of the profession. The *underestimation* of the profession was also mentioned several times.

1.2.2.4 Approach

Most benefit was expected from testing for (PED) drug use. In this context, the collective bargaining agreement no 100 (CAO 100) was also mentioned as the legal framework. In this context, testing should be linked to behavioral change and a customized program of counseling (with an offer of assistance). Raising awareness also proved to be important. It was also highlighted that stress and time pressure are a social phenomenon and that their approach and consequences could not be the sole responsibility of the transport sector.

1.2.2.5 Needs

First of all, they were asking for an *awareness-raising campaign* 'for the driving population', and in particular for the transport employees. According to the group, there was a lack of knowledge about the side effects of many (PED) drugs.

A consistent policy, with a clear role for all actors, was found to be an important condition for an efficient approach of the PED theme. The lack of a legal framework (such as Cao 100 in the private sector) for the public sector received a lot of attention.

The need for advice and expertise on substance use, and medication and PED use, in particular, was also discussed. Finally, the need for better cooperation with the curative sector was also addressed.

1.3 Conclusion

The results of the survey and the focus group showed that caffeinated drinks were by far the most consumed. Drinking coffee every day is a certainty for many transport employees, especially those over 35 years of age. Alcohol (40.0% drinks weekly) and food supplements are also included. Food supplements and vitamins were used significantly more by younger workers and by women. Most of the workers did not take cannabis, and if so, it was taken mainly by workers under 35 years of age. All the other substances surveyed were proportionally much less common. The use of AAS was very exceptional.

Coffee and energy drinks were mainly consumed out of habit, because of dependency, and also because of taste. Alcohol mostly for social motives, to a lesser extent for PED motives (e.g. mental problems). Food supplements, sleeping pills, sedatives or antidepressants were mainly used for PED motives: employees took these products to improve cognitive and physical functioning at work, to deal with physical complaints, or to improve appearance.

Among the stakeholders, the motive for use determined whether there was a PED. As the main reasons for use, they mentioned time pressure, changing working hours and stress. In a safety-sensitive environment such as the transport sector, the demand for testing drug use proved very pertinent. Finally, the stakeholders mainly needed a drug policy within a clear legal framework. Striking was the demand for specific information about medication use, and its consequences in the workplace.

2 Subsetting prison

In order to map the motives for the use of PED within Belgian prisons, a questionnaire was conducted among prisoners, individual interviews were conducted, participatory observations were made and focus groups were organized in 5 different prisons. In Flanders, a questionnaire was conducted among 46 prisoners in the prison of Hasselt. In Brussels, a focus group was organized and interviews were conducted in the prison of Sint Gillis. Finally, in Wallonia, interviews were conducted and focus groups were organized in the prisons of Andenne, Jamioulx and Lantin.

2.1 Flanders

To get a concrete idea of the prevalence of PED use in prison and the factors associated with it, a pencil and paper survey was prepared. In the first part of this questionnaire, the level of sports practice, body image, and health of the prisoners was examined. Next, questions were asked about the use of AAS. Questions were asked about the use of these substances before the respondent ended up in prison, as well as about their use during the current detention period. In addition, it was asked whether the prisoners knew other fellow prisoners using AAS and whether they had already been approached to purchase such funds themselves. These questions were followed by some questions asking about the potential negative effects of using AAS and whether the prisoner had consulted assistance for this. Finally, some questions about the respondents' demographics followed.

A second part of the research protocol was provided for individual interviews with the prisoners. These interviews were framed as a short debriefing with the individual prisoners to check whether they had filled in all the questions correctly. In this way, the anonymity of the prisoners could be guaranteed.

2.1.1 Pre-test DFU Bruges

The questionnaire was first tested among male prisoners who practiced fitness in the prison of Bruges. In this way, researchers first checked if the research protocol was achievable and if the question was formulated realistically. This pre-test was taken among 10 prisoners in the drug-free unit (DFU) who practiced fitness and were willing to complete the questionnaire. Of the 10 prisoners who completed the questionnaire, none of them indicated that they had ever used AAS before. However, 3 persons indicated that they knew a fellow prisoner who uses AAS. In addition, one prisoner indicated that he had once been approached to buy AAS in prison. When these respondents were asked whether they were willing to discuss the questionnaire briefly so that the researcher could test the interview protocol, they refused each time.

2.1.2 Prison Hasselt

After approval of the management and since the questionnaires focus on persons doing sports in detention, it was decided that the researcher could take the questionnaire from the persons who were allowed to train in the gym. Every hour 7 prisoners were given permission to do so. The researcher stayed in the gym all morning. A total of 14 prisoners agreed to complete the questionnaire. The other prisoners did not speak Dutch or refused to cooperate in the investigation. The prisoners filled in the questionnaire before they worked out. The investigator then checked whether these persons ever

admitted to having used AAS. This was the case for 2 persons. The researcher worked out with the prisoners so that they could talk about their experiences with PED. When asked about their experiences with steroids, the users suddenly said that they had never used steroids. They were also unwilling to participate in a separate interview about their experiences.

In the afternoon the researcher went along with the prisoners who were taking circuit training classes. The 9 people who spoke Dutch completed the questionnaire. None of these people reported ever taking steroids.

The questionnaire was then conducted in one complete department. 2 prisoners refused to participate. The other prisoners filled it in, alone in their cell. Afterward, the research passed by to collect the questionnaires. Again, the prisoners didn't want to participate in an interview. Due to the control of the staff, who were always present during the collection of the questionnaires, it was not possible to do so.

In total, 5 persons (10.9%) of the 46 participants indicated that they had already made use of AAS before their imprisonment. 3 of these indicated that they had used these substances in detention. Among the users, there were 3 who had a permanent partner at the time of the survey. In addition, 3 of the steroid users used other illegal drugs both during and before their current detention period. The users did not differ significantly from non-users in the frequency of their fitness training, the number of sports they practiced within detention or their own body image.

There were 15 prisoners (32.6%) who reported knowing another fellow prisoner who uses AAS. In addition, 12 respondents (26.1%) indicated that they had ever been approached in detention to buy or use these drugs.

2.2 Brussels and Wallonia

In Brussels and Wallonia, we conducted a research in 4 prisons: both a detention center⁸(Jamioulx, Lantin, and Saint-Gilles) and a penal center⁹ (Andenne, Jamioulx, and Lantin). The study showed that anabolic steroids are used within detention, but that their prevalence is difficult to estimate. The use of anabolic steroids sometimes already exists before prisoners enter prison. In other cases, the use starts during the stay in detention. There were more prisoners who said they were offered anabolic steroids in prison or prisoners who say or think they know other fellow prisoners who use anabolic steroids, than prisoners who admit to using these products.

Although in the existing scientific literature the relationship has been little investigated, the use of anabolic steroids in this research has always been associated with the practice of sport in prison. Where "classic" drugs can be placed in a context of dependency on the product, a reaction to boredom, difficulties or adaptation to certain norms and subcultural values specific to detention (Connor & Tewksbury, 2016; Mjaland, 2016), the use of anabolic steroids seems to be more "targeted" behavior. After all, these products are used to increase muscle mass, become stronger, be able to 'push' themselves more and be prouder of their body. These are also the motivations classically provided by anabolic steroid users outside of prison (Kimergard, 2015). Consequently, the use of anabolic steroids seems to be related to sports practice within detention. Besides, the individual characteristics of the prisoner also play a role. In particular, inmates' experience of sports before they entered into prison seems to have an impact on the use of anabolic steroids in prison (i.e. in the case of sports which themselves foresee a high risk of doping).

Certain factors also affect the non-use of anabolic steroids. The first factor concerns the availability and in particular the price, of this type of product in prison. Compared to other drugs, anabolic steroids are considered quite expensive by the prisoners with whom we have spoken, which could explain their rather limited use. The ways to get to anabolic steroids were described by the prisoners as fairly simple and were the result of individual tricks mainly based on the creativity of the smugglers.

The analysis of the problem of anabolic steroids in prison cannot be dissociated from the use of "classic" drugs (e.g. cannabis, cocaine, etc.) on the one hand, and the organization of sports activities in prison (role of sport, access to facilities, etc.) on the other hand.

⁸These are prisons for people who have not yet been convicted.

⁹These are prisons for people who have already been convicted.

3 Sub-setting fitness

3.1 Focus groups fitness

In order to investigate the motives for the use of PED within the fitness sector, we organized three focus groups with fitness practitioners and coaches. The focus groups took place in Brussels, Flanders (Ruisselede) and Wallonia (Luik). Between three and six participants were brought together to discuss the theme 'fitness and health' for an hour and a half. The PED theme was not immediately mentioned in order not to scare respondents. The focus groups took place from the end of June 2019 until the beginning of July 2019.

The interview guide covered the following topics: fitness training (types of training, intensity), the personal motivations to participate in this type of activity, the perceived link between health and performance, attitudes towards taking performance-enhancing products, the fight against doping and existing (Flanders) or future (Wallonia-Brussels) controls in fitness centers, and the perception of a possible doping problem in the world of fitness (consumption, sales, etc.). The focus groups were recorded and transcribed and then made anonymous.

The motives cited by the participants to explain their use of performance-enhancing drugs consist of two categories: the search for a certain aesthetic standard and the desire to increase physical capacity. Anabolic steroids can, therefore, help to obtain the desired body image. This desired body image often refers to fantasized ideals of masculinity or femininity in a social context that emphasizes performance and where everyone always wants more and wants to push back boundaries in a constant quest to surpass themselves.

Those most at risk of doping would be among the "hyper frequent" athletes, i.e. those who go to the fitness at least three times a week. Within certain fitness disciplines, the risk of doping is also considered higher than within others. This is especially true for bodybuilding, but also for CrossFit. Moreover, the low-cost sector is criticized by the participants for leaving athletes to their fate and thus potentially falling prey to sellers of illegal products.

The results of the focus groups finally confirm the results of the quantitative research, namely that the participants did not make a clear difference between nearby sources to get to PED (social supply, i.e. coach, other athletes, fitness manager, etc.) and the Internet. The two sources seem to exist side by side without one dominating. However, the supply of doping products, even when ordered over the Internet, is still largely liable to sharing experiences about effects, doses and so on between fellow users. This underlines the need for reflection on the methods of certification and recognition of coaches in fitness clubs.

3.2 Survey doping users

In collaboration with NADO Flanders, a survey was developed into the experiences of doping offenders, more specifically sportsmen and sportswomen who were sanctioned by NADO Flanders after being caught using doping products in the past two years (2017 and 2018). The questionnaire was sent in September 2019 to 120 people. The questionnaire was sent in an envelope, containing an explanatory letter from NADO Flanders, a letter from Ghent University explaining the research, the questionnaire itself and a blank envelope with a stamp for return, addressed to the research team of Ghent University. 5 questionnaires were returned blankly to the research team because they couldn't be delivered. A total of 11 people responded to the questionnaire.

3.2.1 Experience suspension

In the first part of the questionnaire, the respondents were asked how they had experienced their sanction. This showed that the sanctioned athletes experienced their suspension as unfair and too severe. Most respondents (n = 7) stated that they felt the victim of a juridical mistake. In addition, they also indicated that they were being sanctioned, while other athletes who are doing the same go unpunished (n = 7). When asked whether the sanction given to the respondent had made him or her think deeply, 4 athletes indicated that they had thought about it. The other five did not agree at all. Moreover, only 3 persons indicated that they had a different view on sports after their sanction. With the exception of one person, all respondents indicated that they thought their sanction was undeserved.

3.2.2 Doping-related attitudes

In the next part of the questionnaire, the respondents' attitudes towards doping were surveyed. The athletes appeared to have a tolerant attitude towards doping.

3.2.3 Motives for use

The participants were then asked why they had used the PED for which they were suspended. 4 persons had used these products to improve their sports performances, 6 to improve their appearance, 3 to lose or gain weight and 2 to prevent injuries. In addition, one person stated that they had used PED to gain self-confidence, while another person stated that they did not know that the product used was on the prohibited list. 5 persons also indicated other motives for their use. For example, one participant stated that he had taken PED because this is his passion. Another respondent indicated that his own goals are higher than his body allows and he therefore resorted to these products. Another athlete gave the following explanation: *"I make the choice for myself to participate unnaturally in bodybuilding competitions and only register for competitions where doping is allowed"*. A fourth person gave as an explanation: *"Because on the website where I always bought my pre-workouts, I was offered something "maybe something for you". I just read some reviews and then ordered it. Since it's also a physical store where everything is on display, I didn't see the problem."* Finally, an athlete admitted to having used a performance-enhancing drug to bring his testosterone level back to normal.

3.2.4 Purchase products

Respondents were asked who they would turn to if they wanted to get PED today. 5 persons would use the Internet for this, and 1 person would use the Darknet. In addition, 2 persons would like to get PED via the doctor and another 2 persons via the pharmacist. 1 person would ask a training partner and another person would ask a sports coach. Moreover, an athlete admitted that he would try to get hold of these products through labs and wholesale sales and speaks of the "doping mafia". Another respondent would buy this within his group of friends as his friends are all in the environment.

3.2.5 Negative effects

Subsequently, the negative consequences experienced by the athletes through the use of PED were investigated. Only 2 people of the 11 respondents said they had ever experienced negative consequences. One person had experienced both physical and mental effects and another athlete had only negative physical effects.

3.2.6 Assistance

None of the respondents indicated that they had ever consulted a counsellor about the negative consequences of their use of PED. When asked about the reasons for this, 3 causes were reported: 'the offer was insufficient', 'the offer did not match my needs/needs' and 'I do not need assistance'.

WP4: Origin PED in Belgium

In the fourth work package, we sketch a picture of the origin of PED on the Belgian market. To this end, we interviewed an expert in the field of drug markets and trade and studied databases containing data on postal items intercepted by the Federal Agency for Medicines and Health Products (FAMHP), customs and the police.

1 What is the origin of performance-enhancing substances on the Belgian market?

The performance-enhancing products available on the Belgian market may either be produced in Belgium itself or may enter the country via international shipments. The origin of the products seized during searches is usually unknown. Two types of databases containing data on postal items were therefore studied, the first of which was analyzed and consisted of seizures of postal items containing PED by the FAMHP, customs, and the police. The second database consisted of seizures of dehydro-epiandrosterone (DHEA). The data for the years 2016, 2017 and 2018 were analyzed for both databases.

1.1 Origin

The origin of 2165 seizures of PED was analyzed. Almost a quarter (24.2%) of all postal items with PED originated from Poland. This was followed by Hungary (15.5%) and the United States (14.3%). In addition, a significant proportion of the shipments came from Asia: China (8.3%), Singapore (5.8%) and India (4.6%). For 15 shipments, the country of origin was unknown. When the 418 seizures of shipments with DHEA¹⁰ were analyzed, we saw that they came from 5 different countries. For 7 shipments, the country of origin was unknown. Remarkably, almost all shipments (97.8%) came from the United States¹¹.

1.2 Types of performance-enhancing drugs

Twenty-one different types of PED were seized. More than half (54.2% or 1174) of the products seized were androgens. Product names often found within this category include Sustanon and Stanozolol. In addition, anti-estrogens (12.9% or 279) and peptide or growth hormones (6.9% or 150) were mainly seized. Among the seized beta-agonists (5.2% or 113) the product Clenbuterol was particularly popular.

1.3 Origin according to expert information

Some of the PED products available on the Belgian market are sold via the Internet. People who wish to buy this type of product use the Internet because it is an easy way to purchase it. The Internet sites on which these people buy are located in different countries. There is always a risk for the buyer that the products may get lost or fail to arrive. However, most sites appear to indicate that the buyer will be sent a new shipment free of charge when the buyer can prove that his products have been seized by customs. However, too few in-depth studies have been carried out to estimate where purchases are most often made on the Internet.

In addition to sending products by post, there is also a lot of transport by road. According to the expert interviewed, there are no longer any internal borders within 'Europe', and traders can bring what they want. In addition, a significant part of the PED is also sold via 'hand in hand' transfer. It should be noted

¹⁰DHEA is a natural pro-hormone that can be further converted in the body into testosterone.

¹¹This is probably due to the fact that DHEA is freely available without a prescription in the United States as it is considered there as a food supplement (Baulieu et al., 2000).

that there is often a parallel sale with food supplements. In addition, several trade fairs would also be organized (e.g. in Germany) where buyers would buy their products.

1.3.1 Production

A number of products always come from other countries. For example, raw materials would come mainly from China, India and Hong Kong. Other doping products are produced at various locations, including Belgium and other European countries such as France and the Netherlands. In addition, many products are produced in East European countries.

The products sold over the Internet are produced in a large number of illegal laboratories. Some laboratories are known to the police services and have been around for years. It is possible that they suddenly change their name after a while, but it is still unknown why this happens. In some countries, however, these are not illegal laboratories. An example of this is Balkan Pharmaceuticals from Moldova. This company is an official laboratory in Moldova, but it is not allowed to export products abroad because Balkan Pharmaceuticals is not registered in other countries.

In addition, many products from large pharmaceutical companies such as Merck Sharp & Dohme (MSD) and Pfizer are also copied. The products they produce, are sometimes stolen. This does not only involve the theft of doping products, but also other pharmaceutical products. The pharmaceutical companies are obliged to report these thefts to the medicines agency. In practice, however, this mainly happens when large thefts are involved.

1.3.2 Organization

Laboratories producing doping products can be organized either in groups or by one or two people. In Belgium itself, there are not really any structured criminal organizations involved in the production of PED. An example of a more structured sale is a 2016 case where a person owned a food supplement company and legally supplied food supplements to a large number of fitness practitioners. This person, therefore, sponsors a number of people who do bodybuilding and sell supplements and encourages them to sell AAS.

In other countries, real groupings are noticed. In this case, someone is responsible for hiding the proceeds, someone is involved in the purchase of products, someone is responsible for the sale and distribution and sending it out to various post offices. In Belgium, an illegal lab has been found¹² a few times already, but never really a large structured group.

The persons to whom postal items containing doping products are addressed may be individuals, existing or not, as well as companies. It is often not known whether these persons are already known in court.

1.3.3 Other drugs production

For a time it was thought that the production of PED was related to the production and sale of other illegal drugs such as the sale of XTC. However, this can't be confirmed. In Belgium, to date, no production of other drugs has been detected in laboratories producing doping products. At first sight, therefore, the production of these drugs in Belgium appears to be rather isolated. Sometimes products

¹²There were illegal laboratories found in Belgium in 2011, 2012, 2013 and 2018.

such as DNP (2,4-dinitrophenol), which is used as a fat burner but is not doping in itself, are found in those labs.

Doping laboratories, on the other hand, are often discovered because drug investigators are tipped off that they are laboratories that would produce XTC. It is, therefore, a priority to find these kinds of labs rather than looking specifically for doping production.

1.4 Conclusion

In order to gain an insight into the origin of PED on the Belgian market, two sources were consulted: a key figure specialized in drug markets and trade, and the customs, police and FAMHP databases for the past 3 years. A first important observation is that, despite the availability of these numbers, it is very difficult to get an overview of the origin of the performance-enhancing products on the Belgian market. As not every postal item is checked and transport by road can be done freely, only part of the data of the seized products could be studied. Moreover, the origin of products is not known when the police find them during house searches.

The data that could be analyzed show that there is a wide variety of products on the Belgian market, with androgens and (pro)hormones being particularly popular. The products seized via postal consignments are mostly of East European origin, Asia or the United States.

In addition, the sale of illegal performance-enhancing drugs in Belgium appears in some cases to be intertwined with the sale of legal food supplements and vitamins. However, there is an urgent need for additional research in order to gain a better insight into this.

WP5: Care provision in Belgium

In the last part of this PED study, we surveyed the existing care provision in Belgium concerning PED substances, both in regular and categorical care. We also looked at what healthcare providers needed most to address this PED theme.

1 Methodology

The questionnaire was distributed to outpatient and residential care workers specializing in substance abuse. We also surveyed general practitioners, doctor-specialists, and doctors from the Psychiatric Departments of General Hospitals (PDGH). Finally, healthcare providers from prisons, labor doctors and sports doctors were also part of this survey.

With the first question in this PED study ('How often did you, as a care provider, receive questions in your practice during the last 12 months about the use of the substances listed below?'), we surveyed the various substances, regardless of the motivation for their use. Subsequently, healthcare providers were asked about the motives for use by patients/clients. For further analysis, we grouped the care providers into three categories: the specialized care providers in the alcohol and drug sector, the occupational physicians and the specialists, general practitioner or others. In this way, we were able to check whether there were differences (and the extent to which) between these groups of social workers.

2 Results

2.1 Profile of care providers

Of the 108 respondents who filled in the survey completely, 56 care providers were men (51.9%) and 52 were women (48.1%). The respondents were largely Dutch-speaking (80.1%). The average age of the participating care providers was 47 (SD = 11). Occupational doctors formed the largest group of respondents (35.2%). In addition, 33 health care providers worked in specialized alcohol or drug centers (30.6%), 26 of whom were ambulatory, and 7 in a residential center. Finally, the questionnaire was also completed by specialists (21.3%), general practitioners (10.2%), care providers in a prison (1.9%) and by one sports doctor.

2.2 Frequency of assistance questions

The most common drugs with which care providers were confronted at least weekly (summing up 'at least weekly' + 'several times a week' + 'daily') was alcohol (indicated by 53.2% of the respondents), followed by the group of antidepressants and sedatives (50.0%) and cannabis (39.7%). A large number of care providers (73.1%) rarely ('ever, but not last year') or 'never' had to deal with anabolic-androgenic steroids (AAS). Also with the use of stimulant medication, with (56.4%) or without (55.8%) medical reasons, most care providers rarely or never came into contact.

We found no significant differences between the different groups of counselors in terms of caffeinated drinks, sleeping pills and sedatives or antidepressants, and AAS. We found striking, significant differences between the various social workers regarding the substances alcohol, cannabis and other illegal substances. Care questions about these drugs were significantly more common among specialized care providers in the alcohol and drug sector.

Of care providers in the specialized alcohol and drug sector, 81.8% received questions about alcohol at least once a week, whereas for general practitioners, specialists, and other doctors this was 54.0%, and for labor doctors 39.5%. In the case of cannabis, 72.8% of specialized health care providers received questions at their practice at least weekly, compared to 43.2% of general practitioners, specialists, or other doctors, and 15.8% of labor doctors. In the case of cannabis, 69.7% of specialized health care providers received questions at their practice at least weekly, compared to 29.7% of general practitioners, specialists, or other doctors, and 7.9% of labor doctors.

Questions concerning stimulant medication, both for medical and non-medical reasons, and questions concerning sleep-inducing sedatives or antidepressants, were significantly less common in the practice of occupational physicians than among specialist healthcare providers, general practitioners, specialists, and other doctors.

2.3 Motives for drug use, according to the estimation of care providers

Especially alcohol (by 81.1% of the respondents) and cannabis (61.5%) were used according to care providers for social reasons, followed by other illegal drugs (42.6%) and caffeinated drinks (mentioned by 36.1% of the respondents). The same four types of drugs were used, according to most care providers, because of habit or dependence (74.6% for caffeinated drinks, 70.5% for alcohol). For two-thirds of care providers, this also applied to cannabis and other illegal drugs. In addition, alcohol (by 67.2% of the respondents), cannabis (68.9%) and other illegal drugs (47.5%) were used, according to care providers, to deal with mental complaints.

According to health care providers, the main PED motives for using caffeinated drinks were to improve cognitive (45.9%) and physical (33.6%) performance at work. Concerning stimulant medication when used on prescription, according to the respondents this concerned use to improve cognitive (44.8%) or physical (29.5%) functioning. When using stimulant medication for non-medical reasons (whether or not obtained on prescription), 36.1% and 31.1% of the care providers indicated these motives respectively. Stimulants could also be used to deal with mental complaints (reported by 28.0% of health care providers when used on prescription and by 23.8% when used for non-medical reasons). Regarding the use of stimulant medication for non-medical reasons, the motive of habit or dependency would also play a role (mentioned by 27.0% of the respondents).

According to care providers, sleeping pills, sedatives and antidepressants were mainly used to deal with mental complaints (81.1%) and out of habit or dependence (67.2%). These motives turned out to be similar when these drugs were used for non-medical reasons (52.5% and 54.9% respectively). According to care providers, vitamins or dietary supplements were mainly used to cope better with physical complaints (49.2%) and to perform better physically (mentioned by 45.9% of care providers). Also to improve appearance (26.2%) and to be able to deal with mental complaints (23.8%) was mentioned by a large number of care providers.

Finally, the majority of healthcare providers found that patients/clients using AAS did so mainly to improve their appearance (67.2%), and to a lesser extent to perform physically better (23.0%). Other PED motives such as use to deal with physical complaints (13.1%) and to perform cognitively better (0.8%) were mentioned considerably less.

When the three groups of care providers were split up, the same motives were mentioned for most of the drugs. In the specific case of alcohol consumption for PED reasons, and the use of illegal substances for social and PED reasons, it was more often specialized care providers who indicated these motives. Also regarding prescribed stimulant medication, specialized care providers more often indicated social motives than their colleagues. In the non-medical use of this medication, specialized care providers more often indicated PED motives. Also in the case of the use of sleeping pills, sedatives or antidepressants, specialized care providers more often indicated both social and PED motives. Finally, it was again care providers from the specialized alcohol and drug sector who more often indicated social motives for the use of AAS.

2.4 Specific assistance offer regarding PED use

Of the 117 care providers who answered the question about a specific care offer for PED users, 37 respondents (31.6%) indicated that they had such an offer, mainly from the specialized alcohol and drug sector (48.6%). In most cases, their offer consisted of referral (mentioned by 26.9% of care providers), sensitization (25.6%), psychosocial or psychotherapeutic interventions (24.8%) and/or minimal interventions (e.g. a counseling interview; 23.1%). In addition, screening (19.7%), aftercare (17.9%), damage-reducing interventions (14.5%) and/or pharmacotherapeutic or medicinal interventions (13.7%) were also mentioned.

2.5 Willingness to provide assistance for PED users

Overall, the willingness to provide assistance was strong (especially among the specialized care providers), and the highest for users of alcohol (93.6%), followed by cannabis users (89.8%) and users of other illegal substances (85.2%). There was more disagreement about the willingness to provide assistance in the case of food supplements and AAS.

2.6 Needs of care providers

The need for information turned out to be the most important, for example about specialized referral possibilities (77.8%), about the effects of PED (70.4%), about psychosocial treatment possibilities (64.8%) and information about aftercare trajectories (63.0%). In addition, there appeared to be a need for (better) cooperation with other care providers in the referral of PED users (64.8%).

Other needs were the need for information on pharmacological treatment options (indicated by 50.0% of the respondents to this question), communication with other care providers (48.1%), communication skills to deal with PED users (42.6%) and concrete numbers on the use of PED (42.6%). In addition, half of the care providers indicated a need for specific support in case of doping use.

3 Conclusion

Care providers were often asked questions about the known drugs such as alcohol, antidepressants, sleeping pills and sedatives, and cannabis. To a much lesser extent, this was the case for anabolic-androgenic steroids (AAS), and for stimulating medication, with or without medical reasons. When differentiating by 'type' of care provided, we saw that, not unexpectedly, requests for assistance regarding alcohol, cannabis and other illegal substances were the most common in the group of care providers from the specialized alcohol and drug sector.

Regardless of the degree of practical experience with the various substances, respondents were able to distinguish for each substance between use for a performance-enhancing effect, or use for social reasons or use out of habit or dependency. It is striking that care providers indicated for each drug that it could be used for both PED and non-PED reasons. Performance-oriented motives were mentioned more exclusively in the use of dietary supplements and AAS. Care providers also clearly indicated that in their experience a lot of resources are used to deal with mental complaints, in order to indirectly improve functioning.

Care providers were also very willing to help patients/clients with PED use. Opinions about help with the use of food supplements and AAS were remarkably differing. In the case of cannabis, stimulants, sleeping pills and sedatives or antidepressants, both for non-medical reasons, the willingness was highest among care providers in the specialized alcohol and drug sector.

WP6: Recommendations

In this sixth and final part of the research report we formulate recommendations based on the results regarding users of PED; actors within the business world, prisons, and fitness; prevention workers and care providers. Both general and specific recommendations are described for the three settings examined. In addition, it is always indicated whether the recommendation is based on research results and information specifically aimed at PED use, or whether the recommendation was formulated based on general information on substance use.

Our research shows that a wide range of products can fall under the PED heading. The motive to use a certain product (e.g. to promote performance or to deal with pain) makes a substance a PED agent. Moreover, PED-specific studies have so far only been carried out to a limited extent. Therefore, in formulating these recommendations, we have also based ourselves on already known effective interventions on substance use.

1 Umbrella recommendations

1.1 Coordinated and integrated approach regarding supply and demand-side

1.1.1 Policy

➤ Umbrella policy

The established *lifetime* prevalence of PED use in the general population (1.9%) and of AAS use in the fitness training context (2.1%) are possibly an underestimation of the problem due to the measurement methods used (see WP2). In order to get a better insight into the prevalence in the general population, the next Belgian Health Survey should also look into PED use (including doping). Based on these data, the health policy can be further adapted to the needs of the population related to PED (Sciensano, 2018). Given the proven overlap between the use of PED (and more specifically doping products) and the use of other (illegal) substances (with different underlying motives), we argue in favor of an overarching policy in which policy on doping and PED use is integrated into existing drugs policy. Prevention, early detection and intervention, damage limitation, assistance, aftercare, and social integration are essential pillars in this respect (Permanent Coordination of the General Drugs Policy Unit, 2010).

At a national level, the 2010 Joint Declaration on Drugs of the General Drugs Policy Cell did not mention objectives and action points on PED in general, and on doping in particular (Joint Declaration of the Interministerial Conference on Drugs, 2010). In the "Realizations 2014-2019 & Recommendations for the next legislature" of the General Drugs Policy Cell, doping is recognized as a priority theme and action must be taken (General Drugs Policy Cell, 2019). It is recommended that this theme is also given a clear place in the next Federal Policy Document on Drugs, both in terms of objectives and concrete action points.

At a European level, PED use was not included as an explicit theme in the EU Action Plan on Drugs (2017-2020). Therefore, it recommends that PED use, and more specifically doping, should be included in the next EU Action Plan on Drugs. Based on this research, Sciensano, as Reitox National Focal Point at the EMCDDA, can address this theme.

➤ Systematization of the approach

Doping use and the import and trade of PED were, as mentioned above, explicitly included in the most recent report of the General Drugs Policy Unit (2014-2019). In addition, the import and production of growth hormones and AAS is cited as a priority theme within the National Security Plan (2016-2019) and in the Framework Memorandum on Integrated Security (2016-2019). Despite the current attention to this phenomenon, the research conducted shows that it is very difficult to gain an insight into the origin of doping products on the Belgian market. As the DISMARK study (De Middelmeer et al., 2018) showed, the Belgian authorities do not have a sufficiently complete picture of illegal drug trafficking. Quality statistics were therefore advocated in this study for adequate monitoring of illegal drug markets.

➤ Sensitization and education police officers

According to expert information from the federal judicial police, there is a need for awareness-raising and training among police officers in order to increase their knowledge about PED products, PED use, and its effects. This knowledge among police officers is important because the use of PED drugs has too often remained below the radar, and as a result, the phenomenon may have been underestimated. Raising the awareness of police actors can be part of the knowledge section of the continuing training courses on the use of illegal substances.

➤ Doping control and alternative sanctions

Doping controls can have three objectives: to combat competitive distortions (among amateur and professional athletes in competitions), to trace the origin of doping products and how sales were organized, and to bring about an individual change in behavior (i.e., to combat doping). Current (inter)national doping policies are based on the assumed deterrent effects of doping controls (Engelberg et al., 2015). The aim of these doping controls is that athletes assess the risk of detection of their use as high (e.g. by frequent checks) or by severe penalties (e.g. high fines), thereby reducing the risk of doping behavior (i.e. inducing an individual behavioral change; Westmattmann et al., 2018). In this way, people would be deterred from using products that could potentially be harmful to their health. However, recent qualitative research in the Netherlands and Belgium has shown that doping controls in fitness centers could be ineffective (Christiansen, 2011) to prevent the use of doping products (van de Ven, 2016) One of the reasons cited in the literature for this is the low perceived risk of detection (Ayotte et al., 2013; Moston et al., 2015). Therefore, the deterrent effect of doping controls is only investigated in studies on professional athletes (e.g. Dunn et al., 2010; Overbye, 2016a; Overbye, 2016b; Waddington et al., 2005). Despite the lack of conclusive evidence on the deterrent effect of doping controls, the importance of the other two objectives of doping controls (competition distortion and source of information for police forces) remains.

In addition, this research into the experience of punishment, such as suspensions and fines among AAS users (WP3) and users (WP3), found that users consider their punishment to be of little use. Since no effectiveness study was conducted into the the current sanctions among users of PED, we are again basing ourselves on existing knowledge about illegal substance use. Interest in the use of alternative sanctions for drug users has increased in recent years as a result of concerns about the (cost) effectiveness of a more punitive approach (EMCDDA, 2015). Numerous international studies have already shown that alternative punishment leads to a reduction in recidivism and drug use (e.g. Belenko, 2001; De Wree, De Ruyver & Pauwels, 2009; Stevens, Trace, & Bewley-Taylor, 2005). In

Belgium, too, it has already been demonstrated that the conditions attached to alternative measures (e.g. following drug treatment or not being in contact with the drug environment) have a positive effect on drug users. Thus, not only is a reduction in drug use or problematic drug use brought about, but progress is also made in other areas of life (e.g. by having a permanent job or a permanent home and creating more social capital; De Wree, De Ruyver & Pauwels, 2009). By analogy with these findings, focusing on alternative sanctions for doping users could, therefore, reduce the use of this type of drugs. It goes without saying that the effectiveness of such alternatives for users of PED should be investigated.

1.1.2 Research

➤ Effectiveness study of doping controls among amateur athletes

As already mentioned, to date no research has been carried out into the effectiveness of doping controls on a possible change in behavior (i.e. not using or using less doping products) among amateur athletes. Existing studies on the effectiveness of doping controls were carried out on professional athletes (e.g. Waddington et al., 2005; Dunn et al., 2010; Overbye, 2016a; Overbye, 2016b). However, measuring this effect appears to be particularly difficult due to the large number of cases in which doping use cannot be established and due to the lack of reliable measurement indicators (Westmattmann et al., 2018). Thus, existing effectiveness research is often based on the *perception* of professional or elite athletes¹³ (e.g. Engelberg et al., 2015; Overbye, 2016). As shown by the research findings, the doping problem is not only situated within the professional sports world. There is, therefore, an urgent need for an effectiveness study into the effect of doping controls on amateur athletes. This type of research should be carried out with amateur athletes both in and out of competition.

➤ Mapping PED offer on the Belgian market

As shown by the research findings in WP4, little is known about the origin of PED on the Belgian market. There is a need for additional research in which the origin of the PED on the Belgian market is systematically mapped out.

1.2 Prevention

1.2.1 Policy and practice

As can be seen from the results (see WP3) and the existing international literature, information on doping is mainly sought via the Internet, among acquaintances or friends. In this way, incorrect information is often obtained (e.g. about the effects; e.g. Althobiti, 2018; Morente-Sanchez & Zabala, 2013). Existing information and awareness-raising campaigns on the use of doping products, such as the KUSm-campaign¹⁴, which provide objective and neutral information, should therefore be further

¹³ There is a discrepancy between different studies about what is meant by an elite athlete. While some studies define elite athletes based on their level of play (e.g., national or international), others use parameters such as professionalism, experience and training time or frequency (Swann, Moran, & Piggott, 2015). Professional athletes are athletes who receive compensation (Hackfort, Schinke, & Strauss, 2019). Amateur athletes are persons who don't receive a compensation for this.

¹⁴ The KUSm-campaign (concerning strength and appearance stimulating drugs) is an anti-doping campaign and initiative of fitness.be where fitness professionals go to secondary schools in the neighborhood to give interactive

extended to other settings, such as the fitness center environment, the prison system, and work-related contexts. Providing information through leaflets or lectures and making the answers to doping-related questions easily accessible is an important element in the prevention of doping. In order to prevent doping from being seen as a possible behavioral choice, value and skills-based education programs can be provided. The aim of such programs is not only to increase knowledge but to strengthen positive values and attitudes that influence decision-making. A systematic review from Bates et al. (2017) shows that interventions that focus on multiple components of behavioral changes are more successful in reducing doping use. The studies that seemed most promising combined education (by providing information on doping) with skills development, changing social norms and setting goals (Bates et al., 2017; Elliot et al., 2004; Nilsson et al., 2004).

1.2.2 Research

There is an urgent need for research into the effectiveness of the existing PED prevention campaigns. Educational anti-doping measures are still a relatively young field of research with few examples of *best practices*. As recently noted by Hauw (2016), the limited published studies examining the effects of anti-doping education programs have produced contradictory or inconclusive results (Backhouse et al., 2014). In addition, the existing efficacy study is mainly focused on adolescents (e.g. Lucidi et al., 2017; Álvarez Medina et al., 2019) in the school setting (e.g. Backhouse, McKenna, & Patterson, 2009), or professional athletes (de Hon, 2016). Research into the effectiveness of such prevention campaigns among recreational athletes or the general population has not yet been carried out within the international literature. In addition, within the existing effectiveness studies, the effectiveness of an intervention is examined based on a change in doping-related attitudes, the perceived effectiveness of a certain measure or the intention to use doping (e.g. Goldberg et al., 1996; Jalilian et al., 2011; Westmattmann et al., 2018). It is still unclear whether these parameters provide sufficient evidence for an actual behavioral change. In addition, it is unknown what effect such prevention campaigns have on people who already use doping.

Although this could not be established in the research conducted, the literature has shown that young adolescents of the male sex who use AAS have a more negative body image (Smolak, Murnen, & Thompsonen, 2005) and more often suffer from an eating disorder (Irving et al., 2002). The research carried out did establish the relationship between the desire to promote the appearance and use of food supplements, vitamins, and AAS in order to achieve this result (see WP2 and WP3). This relation has implications for education and health promotion. As noted by Yager and O'Dea (2008), it is not clear whether school interventions that try to improve the negative body image are effective among adolescent boys, as these initiatives were often developed to counter peer influences for young girls. Nilsson et al. (2004) are therefore setting up a 2-year intervention program to improve self-confidence and awareness of appearance ideals in adolescent boys, with the aim of reducing AAS use to impress girls. They found that the use of AAS in pill form did not decrease, but that the abuse of AAS through injections decreased significantly. However, this was only the case for adolescents under the age of 17.

Furthermore, Pope et al. (1997) stated that some athletes such as bodybuilders and weightlifters are particularly vulnerable to both abuse of AAS and a condition called 'muscle dysmorphism'. In doing so, the athlete is obsessively engaged in ensuring increasing muscle mass. The symptoms are related to

workshops about these strength and appearance stimulating drugs. In addition, they travel to all Flemish prisons to raise awareness about the use of these drugs.

those of a *Body Dysmorphic Disorder* (Baum, 2006). Future research could investigate whether combining existing interventions with interventions that prevent a negative body image have a greater preventive impact than the current prevention campaigns that mainly focus on providing information about PED. Preventive interventions could, therefore, be used in healthier ways to achieve the same physical performance and external promotion without resorting to drugs.

1.3 Assistance

1.3.1 Policy and practice

Existing international literature shows that a large proportion of PED users are involved in polypharmacy. This can consist of a combination of various PEDs, as well as the use of PED in combination with other recreational (illegal) drugs (e.g. Dodge & Hoagland, 2011; Ip et al., 2012; Maher, 2008; Salinas, Floodgate, & Ralphs, 2019). Thus, there is a need for an integrated assistance offer for PED users, whereby the assistance to PED users is integrated into the existing network of social and medical facilities for drug assistance. A precondition for this, however, is that the attention for, the screening of and the expertise in PED among (drug) providers is sufficiently present (cf. infra screening and assistance). An approach that addresses all aspects of the drug problem requires the involvement of all relevant services and actors. This requires cooperation and coordination between these different actors (Heed, 2006).

1.3.2 Initiatives focused on the role of care providers

➤ Awareness-raising PED theme to care providers

We advise to raise awareness in primary care and professional drug care about the use of PED, and the increasing attention for this in (international) research. This can be done by, among other things, valorizing the results of this research in publications and by giving explanations at congresses for care providers. This is a necessary condition to be able to realize an offer to PED users yourself or to expand this offer. After all, our research shows that little is done on the subject, especially regarding doping (WP5).

➤ A specific role of primary care in screening for PED use, and its motives and consequences

An integrated assistance offer for PED users implies that because of poly-use, not only the use of illegal drugs within the assistance has to be screened, but also the use of PED. Primary care and welfare can identify PED and provide early assistance to clients and refer them to specialized treatment when necessary. However, because the use of PED is not detected in primary care, persons using PED remain under the radar.

PED users with (help) questions regarding their use should be able to contact general practitioners, occupational physicians, and other primary care workers. That is why we advise front-line workers to ask explicitly about the motives and effects of substance use. This will help us gain insights into the profile of the PED user. For example, research among general practitioners indicates that they should be more aware of substance use at work, and of PED use in particular (Nicholson & Wilson, 2017).

➤ Integration of the PED theme in the formation of doctors

In order to expand the PED offer, and so that care providers can assume their role, the integration of the PED theme in the formation of doctors is recommended. Knowledge regarding PED use and its approach is limited. In our research, both care providers from regular and specialized care appeared

to have limited knowledge about PED use and its approach (WP5). Care providers need more information about PED use and its effects. Specifically for non-specialized assistance, there was a demand for information about referral possibilities.

In this context, we refer to the Belspo project UPTODATE 2 (2017), which looked into factors that can influence the approach to substance use by general practitioners and occupational physicians. One of the recommendations concerned the introduction and/or continuation of specific alcohol and drug modules in the (interuniversity) training of general practitioners and occupational physicians, as well as in refresher courses.

The abovementioned research from Nicholson and Wilson (2017) also formulated concrete recommendations on PED use in patients of general practitioners. By extension, the advice below may apply to all first-line workers:

- General practitioners should be aware that prescribed medication can be used by healthy people because of a PED motive;
- General practitioners can inform patients about PED use and its risks, and express their concerns about purchasing it via the Internet;
- General practitioners can advise patients to use other, safe ways to improve their performance, such as a healthy lifestyle, sufficient exercise, and moderate alcohol consumption.

➤ Screening of substance use in the context of occupational health surveillance by the occupational physician

An occupational physician has an important task in the health assessment of workers, including during periodic medical examinations and when returning to work after a period of (long-term) incapacity for work. They also play a role in health-promoting activities at work. Within the framework of the UPTODATE 2 project mentioned above, a consensus guideline for the screening and early detection of problematic alcohol consumption was developed in collaboration with a representative group of occupational physicians. This guideline is currently (in 2020) being examined for validation by CEBAM. The next step is to extend the guideline to the use of other drugs. In both guidelines, the PED theme could be integrated into the section on short-term interventions, which is linked to the screening score.

➤ Creating and optimizing communication and collaboration between general practitioners and occupational physicians

The cooperation between general practitioners and occupational physicians can be improved. The UPTODATE 2 study showed that people do not know each other, that general practitioners do not know what occupational physicians do and question their independence given the link with the workplace (employer). However, both GPs and occupational physicians are important partners in a first-line approach to alcohol and drug problems, and cooperation is necessary (Kääriäinen et al, 2001; Van Royen et al, 2015).

In order to prevent (problematic) PED use and to tackle it at an early stage, we advise front-line workers to communicate and/or collaborate transparently. Clarity about and recognition of everyone's role, and respect for everyone's professional secrecy are important principles in this respect. In accordance

with the provisions of the Royal Decree on health surveillance of employees (2003), this communication between general practitioners and occupational physicians is also possible. *For example, the occupational physician may ask the employee, where he observes an impairment to his health, to consult his attending physician. Subject to the employee's consent, he shall provide the attending physician with all useful information* (Art. 20, § 2).

➤ Additional resources for PED theme

The question arises as to whether the current drug assistance services have sufficient resources to explicitly include PED use in their offers. For example, research conducted by the Federal Knowledge Centre for Health Care into the thresholds in alcohol assistance shows that an adapted care organization (with respect to the theme and the target group) can facilitate access to help (Mistiaen et al., 2015). It has already been established that the provision of drug assistance in Belgium suffers from a capacity problem and is insufficiently diversified (Vanderplasschen et al., 2002; Vlaamse Vereniging Verslaafdenczorg, 2019).

1.4 Harm reduction

One of the purposes of doping controls is to deter people from using products that could potentially be harmful to their health. However, recent qualitative research in the Netherlands and Belgium has shown that doping controls in fitness centers could be ineffective to prevent the use of doping products (van de Ven, 2016). Moreover, they could cause undesirable negative effects, as demonstrated for example in the focus group with steroid users (WP3). Users no longer train in a fitness club, but at home or in hidden, private fitness centers.

1.4.1 Policy and practice

A harm-reducing anti-doping strategy implies accepting the use of these drugs and shifts the focus to making their use as safe as possible, with the user experiencing as few negative consequences as possible (Smith & Stewart, 2008). A large number of studies have already shown that harm reduction measures produce positive effects in the context of illegal drug use (e.g. MacArthur et al., 2012; Palmateer et al., 2010; Toumbourou et al., 2007).

When looking at doping specific information, the literature suggests that harm reduction strategies for amateur athletes should also be used (e.g. Aubel & Ohl, 2014; Henning & Dimeo, 2017; Kayser & Tolleneer, 2017; Kirkwood, 2009). In the field of cognitive performance enhancement, a study from Switzerland has shown that psychiatrists and general practitioners are willing to prescribe this type of PED in certain cases to relieve the suffering of their patients (e.g., to better cope with social anxiety; Ott et al., 2012)¹⁵. As no research has yet been conducted into the effectiveness of harm reduction strategies in PED use, the following recommendations are based on research into illegal substance use.

In their research, Kimergård and McVeigh (2014) point to the potential barrier to health services of the availability of information from other steroid users. These services are rather seen as an incredible source of information, which was also found in the focus group with users (see WP3). Health institutions should provide information in an efficient and credible way. However, in the case of active users, information campaigns (see 6.1.1) will overshoot the target.

¹⁵When therapeutic alternatives are not available.

➤ Peer education and peer support

Both in international research (e.g. Kimergård en McVeigh, 2014) and in our own research (WP3) it appears that active doping users do not accept campaigns that come from the government and health services. Much more trust is placed in the information that comes from (possibly also using) peers. For these reasons, peer education can be used.

Peer education is an educational form of health care in which individuals from a particular group are trained to impart specific knowledge in order to bring about a change in behavior in their *peers* or other individuals who are also part of this group (Svenson, 1998). This type of preventive or harm-reducing measure has been studied by several researchers for its effectiveness in the context of illegal substance use and has been found to be effective (e.g. Faggiano et al., 2005; McDonald et al., 2003; Shiner & Newburn, 1996). Recently, peer education was also used among young people to combat doping (e.g. Fallace et al., 2019), but the effectiveness of these strategies has not yet been investigated in the specific doping context.

2 Setting specific recommendations

2.1 Work

➤ More prevalence study on PED use among employees

In a recent prevalence study on substance use among Belgian employees, 11.3% of respondents said they had ever taken prescribed medication for non-medical reasons. The motives for this use were not questioned (Lambrechts et al, 2019). International research indicates that an increasing number of workers are reporting PED use (Leon et al, 2019; Novak et al, 2016), although quantitative estimation is difficult due to non-prescription use and Internet sales (EU-OSHA, 2015). In this PREVPED study, for the first time, we explicitly surveyed PED use among Belgian employees working in the transport sector (WP3). More Belgian research into PED use is recommended.

➤ More research into the motives and effects of PED use among employees

The transport workers in this study appeared to use PED for several reasons, of which improving cognitive and physical performance at work and dealing with mental and physical complaints were the most important. This observation is also evident from international research (Muller et al, 2013). Striking is the increasing use of PED by healthy employees to maintain or improve work performance. This use is associated with a working environment that is becoming more digital and flexible. The importance of cognitive functions increases, while work-related stress, varying working hours, and sleep deprivation, among other things, can have a negative influence on them (Kiepek & Baron, 2017; Brühl & Sahakian, 2016).

The European Agency for Safety and Health at Work also expects increasing PED use, while its effects on workability are debatable or unknown, both in terms of short-term and long-term effects. Furthermore, the desired effects are questioned, given their limited research and methodological limitations (EU-OSHA, 2018). For example, the agency stresses the absence of longitudinal research on the effects of PED use, as well as on the effects on healthy workers. Due to the complexity of PED use,

EU-OSHA recommends that specific PED use should be assessed in healthy individuals. Possible side-effects also need to be better investigated.

Therefore, we recommend that also in Belgium more research is conducted into the diversity of motives and situations in which employees use PED to improve their performance, as well as into the causes of this use at work.

- Raise awareness among business actors about PED use and work-related effects, and their role in a preventive approach

Awareness-raising initiatives for employees about the effects and risks of PED use are best supported by the various actors within the business world. Such support highlights the importance of the issue and also increases the credibility of the actions. It is therefore advisable to raise the awareness of business actors on this subject, with the aim of achieving this:

- Increase their knowledge about PED use and its effects;
- Increase their insights on motivation of use;
- View the link between PED use and possible safety issues;
- Taking into account the link with organizational characteristics (organizational culture, organization of working hours, work profiles, performance appraisal, etc.);

The PED theme can be integrated into existing training courses for company actors (e.g. the interuniversity training courses for occupational physicians and the specialized postgraduates for psychosocial prevention advisers). Specialized alcohol and drug organizations (such as the Flemish Alcohol and Other Drugs Expertise Centre) can be involved. However, additional tasks also require additional resources. Federal and regional public health and employment services can support these initiatives.

In order to raise awareness among employees in companies, we recommend working with prevention and protection services at work. Prevention advisers (PA safety, occupational physicians, psychosocial aspects) can place PED use on the agenda in companies based on their welfare tasks. This can be done, for example, within the framework of the Annual Action Plan (AAP) and/or the Global Prevention Plan (GPP).

- Demand from companies for testing of substance use in a policy-based approach

In a safety-sensitive environment such as the transport sector, the demand for testing drug use proved to be very pertinent. Driving and substance use do not go together, and testing for use can be an aid to this. However, it is appropriate to point out the effectiveness of such tests and the conditions to which they are subject. For example, the effectiveness of testing as a strategy is limited, and the evidence for increasing safety is weak (Pidd & Roche, 2014; Macdonald et al, 2010). In the context of a preventive alcohol and drug policy, testing for substance use cannot be carried out in isolation, and other measures (e.g. information, rules on use) are necessary. Internationally, a multi-component policy is seen as an important tool to avoid or address alcohol and drug-related problems at work at an early stage (Knight et al, 2016; Webb et al, 2009).

We advise companies to work (again) on such a policy and to explicitly include the PED theme. An overall policy includes rules on the availability and use of alcohol and drugs at work; procedures in case of functioning problems; early detection and referral of workers with resource problems; and information and formation. Various researchers underline the importance of an environment-oriented (ecological) approach. Both individual and organizational factors are taken into account, and the responsibility of both employer and employees is underlined (Ames & Bennett, 2011; Marchand, 2008).

2.2 Prison

Drug use in prison poses serious physical and psychological health risks to the user (EMCDDA, 2014). Moreover, this drug use in detention also causes problems for other (non-users) prisoners, such as theft or violence (Stöver, 2017). During the detention period, users can be reached who have not (yet) had contact with the specialized assistance, as was found in the PROSPER-project (Favril & Dirkzwager, 2019; Vander Laenen et al., 2017). An integrated policy is therefore needed to prevent, treat and reduce drug use in detention (EMCDDA, 2012).

➤ Integrated policy

Also within detention, international research (e.g. Lood et al., 2012) has shown that AAS use is often accompanied by the use of other drugs, and AAS is often used as a secondary drug. This was also shown by the survey conducted among prisoners (see WP3). In this way, PED assistance should also be integrated into general drug assistance within detention.

➤ Screening

Indications of a drug problem should be identified as early as possible within detention and (if necessary) referred to the appropriate assistance at an early stage (UNODC, 2018). In Belgium, a standardized screening procedure has not yet been implemented for the notification of new prisoners (Favril & Vander Laenen, 2018). It is therefore advisable to systematically screen for the use of drugs for PED motives.

➤ Assistance and prevention

PED information and prevention campaigns are less compelling than repressive measures (Verhelle, Vanhouche, & Huys, 2016). Also within detention, existing campaigns must be examined for effectiveness.

As shown by the focus group among detainees (WP3), the step to make use of assistance within detention in the event of a PED problem or the associated health risks are sometimes large. Detainees should be able to use existing facilities in a secure, confidential manner. In addition, the specialized staff of the assistance must have knowledge of the symptoms and signs of PED use. As with the use of illegal substances, assistance for the use of PED within detention should be provided voluntarily. In addition, PED users who have problems should be motivated to undergo an assistance program in a safe, separate environment (Stöver & Kastelic, 2014).

A comprehensive and integrated approach to the drug problem also requires continuity of care after the detention period (PHE, 2018; Vander Laenen et al., 2017). This presupposes that the detainee is referred to the appropriate assistance and aftercare after detention. In this way, the trajectory within detention and the treatment trajectory outside detention must be attuned to each other in terms of

both content and organization (EMCDDA, 2012; Vander Laenen et al., 2017). The provision of drug assistance in prison should be equivalent to services provided outside prisons. The continuity of the treatment of detainees entering and leaving prison thus requires close cooperation between prisons and external agencies (Stöver & Kastelic, 2014).

➤ Harm reduction strategies

Also in prison, it is necessary to provide reliable, evidence-based interventions that reduce the risk of negative health risks related to the use of PED. These health risks when using AAS are even greater when the user injects them because sharing needles or using old needles can lead to various health problems, including hepatitis B and C infection and HIV transmission. Within detention, needle exchange programs have been established worldwide as evidence-based intervention (Lazarus et al., 2016; Sander et al., 2016; UNODC 2014). It is proving to be an effective method to reduce health risks in injecting use such as HIV and hepatitis B and C (Busch et al., 2013) and has already been successfully implemented in prisons of various sizes, safety levels and different types of detention (Lines et al., 2006; Stöver & Hariga, 2016). International research shows that needle exchange is an effective and cost efficient harm reduction measure that works in various prison settings and reduces needle sharing among drug users, reducing the risk of transmission of various diseases for both detainees and prison staff (Stöver & Harige, 2016). Encouraging detainees to use sterile needles does not lead to an increase in drug use or injecting behavior and can be successfully used in combination with other drug prevention and assistance programs (Lines et al., 2006). Detainees should have easy and confidential access to needles and injection equipment, as well as the ability to safely remove needles (Stöver & Harige, 2016). A condition for the implementation of this intervention is that both detainees and staff receive sufficient information about the intervention and are involved in its design and implementation (Harm Reduction International, 2016).

In addition, peer education can be used in detention. A systematic review from Bates et al. (2015) already showed that peer education interventions within detention are effective in reducing various forms of risk behavior, including the reduction of transmittable diseases related to drug use. Existing initiatives such as the KUSm campaign already use a form of peer education by sending athletes to the various Belgian prisons and providing information sessions on PED. It is important that objective and neutral information is cited and that not only the risks related to the use of PED are focused on. The use of ex-users is recommended for user interventions. In the case of universal prevention, however, aimed at *non*-users, research shows that initiatives that allow ex-users to have their say are not effective in preventing drug use among the general population and may even have negative effects (UNODC, 2015).

2.3 Fitness

➤ Prevention campaigns

Existing prevention measures and information campaigns within the fitness sector focus mainly on adult male fitness practitioners (van de Ven, 2016). Due to this continued focus on male AAS users, other groups using AAS (e.g. adolescents and women) remain ignorant of the use. In addition, the effects of other PEDs should not be underestimated (e.g. image-enhancing drugs such as melatonin; Christiansen, 2011). General information campaigns should therefore not lose sight of other user groups and other PEDs.

Moreover, the survey among fitness practitioners (WP2) has shown that more than half of the fitness practitioners also participate in another sport at least once a week. They are therefore not people who only practice fitness, but are more likely to complete their sports training with fitness training. Prevention campaigns should therefore also focus on various types of sports clubs rather than just the fitness clubs.

➤ Engagement fitness clubs

In 2015, the first health charter¹⁶ in Flanders was developed by fitness.be and the Fitness Network. Fitness clubs that are not yet affiliated should be encouraged to sign the health charter. Clubs that sign the charter commit themselves, among other things, to strive for a doping-free club and to inform employees and members about doping use, point out zero tolerance in the club and guide them. The clubs also undertake to co-operate spontaneously during doping checks and to immediately send the attendance lists of all sportsmen and sportswomen present to the inspectors, and to notify official bodies when doping practices are detected or indicated (Dopinglijn.be, n.d.). Moreover, it is recommended to make this health charter possible for the whole of Belgium.

➤ Guidance fitness staff

The fitness staff is the first line between the fitness practitioner and the fitness center. Research has shown that sports coaches generally recognize the importance of their role in the prevention of doping (Laure, Thouvenin, & Lecerf, 2001), but that the perception of this importance varies according to the training the coach has received. For example, sports coaches who obtained a recognized certificate and regularly follow new training courses on doping would underline their importance more (Blank et al., 2014; Engelberg, Blank, & Moston, 2017; Judge et al., 2010). It is therefore important that fitness coaches are trained to help their clients achieve their health and fitness goals without having to resort to PED. Every instructor or coach should have basic knowledge of PED. Coaches and instructors are the key figures in conveying important information about the benefits of training without PED. They can have an important influence on the behavior of athletes, especially at a young age (Ennett et al., 2011). Fitness staff should have knowledge of the signs of doping so that they can identify it; have information on the negative impact of doping so that they can communicate it to fitness professionals, and have information on sports and nutrition schedules so that they can adequately target fitness practitioners. In addition, with the emergence of new products, such as synthetic growth hormones (see WP1), there is a need for continuity of training for fitness personnel.

➤ Research

As shown by the focus group with AAS users (see WP3), some fitness practitioners who use PED train in small (or private) fitness clubs where the members know each other more personally. In the survey conducted, it was mainly large(r) fitness chains that sent out the online survey (see WP2) to their members. The small fitness chains or private clubs were less covered in this study. Further research could determine whether these smaller clubs have a larger and different type of PED problem.

➤ Implementation of decree on doping controls

In Flanders, NADO Flanders can already carry out doping checks in fitness centers. In Wallonia and Brussels, this was provided for by the Decree of 20 October 2011 in the fight against doping (M.B.

¹⁶ This was first called the anti-doping charter.

30/04/2015). However, this decree has not yet been implemented. It is therefore recommended that this decree be implemented.