Evaluating the acceptability, usability, utility, and implementation of a PIED e-learning module(s) and the Safe You app: findings from a comparative European project

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Content

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1. Introduction

The use of performance and image enhancing drugs (PIEDs) including anabolic- androgenic steroids (AAS) in professional sports has received much academic and policy attention, with use being predominantly discussed in relation to 'doping' to enhance sporting performance among professional athletes (e.g. UK Anti-Doping Agency, WADA; Bates et al., 2017; McVeigh and Begley, 2016; Pope et al., 2014a). However, the use of PIEDs by elite athletes is only a small proportion of the overall PIED market, and PIEDs are used by those not professionally engaged in sports (e.g. amateur athletes, recreational sports and fitness enthusiasts), and by the general population, leading to the suggestion that PIED use is an important public health issue (Christiansen, 2016; McVeigh & Begley, 2017).

Although PIED and AS use among the general population is low, concern has been raised in response to the emerging use among the general population such as young, recreational gym and fitness enthusiasts, and non-athletes (McVeigh & Begley, 2016; Sagoe et al., 2014; Zahnow et al., 2017). There are few robust estimates of PIED use, but one meta-analysis estimated a global lifetime prevalence rate of anabolic steroids (AAS) use to be 3.3%, with higher prevalence among males (6.4%) than females (1.6%) (Sagoe et al., 2014). Within Europe specifically, the Fitness Against Doping report published by the European Health and Fitness Association (EFHA, 2011) surveyed users of European fitness centres and found that 2.5% (N=8238) of the respondents reported use of prohibited by WADA substances. Research conducted in the countries participating in this project has estimated use among the general population. For example, research conducted in Finland (Salasuo & Piispa, 2012; Hakkarainen et al., 2015; Karjalainen et al., 2019) estimated that approximately 1% of adults had used PIEDs at least once in their life time. The only source of information of anabolic-androgenic steroids use in the UK is the Crime Survey of England and Wales (2018). According to the survey, 0.2% of the population aged 16-59, and 1.2% of young people aged 16-24 have used anabolic steroids at least once during their lifetime. In the North West of the UK, there has been an increase people who use AAS accessing needle and syringe programmes in the UK, who now account for 54.9% (n=2446) of all clients (McVeigh & Begley, 2016). Research conducted in Greece suggests that almost 10% (n=74) of competitive athletes had an experience with doping practices (Lazuras et al., 2010). Similarly, a European study demonstrated that almost 20% (n=145) of fitness

exercisers aged from 18 to 25 years old reported experience with using doping substances[1] (Lazuras et al., 2017). Generally, PIEDs prevention in Lithuania belongs to NADO, but the number of individuals using PIED is unknown. In the Netherlands, recent prevalence data are also lacking. A survey (N=447) conducted ten years ago among members of fitness centres aged 15 years and older found that 8.2% (n=37) had used a PIED in the past year (Stubbe et al., 2014). Stimulants to lose weight had the highest prevalence (4.8%), while anabolic steroids were used by approximately 1% (n=4) of members. The use of substances to counteract side-effects of AAS (1.1%), growth hormone and/or insulin (1.1%0 and prohormones (0.8%) were also reported. Note that given the use of different definitions of PIEDs applied within these individual studies, different methodologies and populations, the prevalence rates cannot be compared across countries.

Motivations for PIED use and the nature of use differs between groups. However, attempts have been made to characterise homogenous groups of those using PIEDs who share similarities with respect to motivations and functions of use. This may allow for better targeting of resources and interventions to reduce use and associated harms. Zahnow et al's., (2018) quantitative study provided support for a typology of PIED users that broadly reflected the findings of Christiansen et al., (2016). Four different types of AAS user and motivations for use were identified. Both discuss groups who are relevantly inexperienced, younger and primarily motivated by fat loss (termed 'You Only Live Once'). Use among this group is infrequent, and they may display co-occurring risk-behaviours (e.g. high alcohol use). This group also source from friends, use oral AAS and tend to report fewer side effects. Secondly, the 'Well-being' type, represents the largest group of AAS user, who are concerned with getting fit, and are unlikely to use other PIEDs in addition to AAS. They use less alcohol and fewer psychoactive drugs than other types, experience less adverse effects related to AAS use and also tend to source AAS through friends. The 'Athlete' type is motivated by muscle and strength gains and differ from other groups in that they combine different AAS and use other PIEDs, along with other psychoactive substances, experience more side effects and tend to source from multiple sources including 'dealers'. Lastly, the 'Expert' type is focused on specific goals that do not just revolve around 'getting fit'. They are

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[1] The definition of 'doping substances' applied is as follows-"Controlled PAES refer to those substances that are used to build muscles, lose weight and generally enhance the athletic performance but are controlled by the government and/or a sport governing body such as the WADA because they can cause harm. Examples of controlled PAES include anabolic steroids, growth hormones, EPO, stimulants, substances that increase blood flow or open airways. With this definition, we do not include any kind of dietary supplements (e.g., vitamins, proteins, and minerals) that are used to enhance nutrition intake and are not controlled and are available to anyone without restrictions."

generally well informed on the science of AAS use, use a lower number of AAS, tend not to drink alcohol, take fewer psychoactive substances and engage in lower risk AAS use. Such research is important in that it highlights diversity in use and motivation, and suggests a need to make information about AAS more accessible, not only to people who use PIEDs, but also to health care workers to assist them in meeting the needs of the various user groups. However, research and interventions tend to focus on AAS use, and less is known about other groups who use PIEDs who may be less heterogeneous. Moreover, whilst this research provides insight into the broad categories if PIED users, it focussed on men and as such cannot be applied to females.

Whilst PIEDs and AAS can be used without serious adverse effects, a range of adverse consequences can occur and are more likely and more severe through long-term use. However, it is important to note that the use of other PIEDs such as weight loss drugs (most notably 2, 4 Dinitrophenol [DNP]) and other substances like insulin can lead to more acute health effects (Grundlingh, Dargan, El-Zanfaly, & Wood, 2011; Heidet et al., 2019). Effects of AAS use include physical effects such as oily skin and acne (which are reversible after cessation), risk of cardiovascular disease and liver damage, as well as psychological harms such as increased aggression, mania and dependency (ACMD, 2010b; Pope et al., 2014a; b). Moreover, most people who use AAS inject (ACMD, 2010b), and studies from the UK, for example, indicate an increase in the number of individuals injecting AAS presenting at needle and syringe programmes (NSP) (Glass et al., 2019; Kimergard & McVeigh, 2014; McVeigh and Begley, 2016). This means that they are at risk of harms associated with injecting (e.g. injection site injuries, bacterial infections and blood-borne viruses (BBV)) (ACMD, 2017; Hope at al., 2017; 2016; 2015; Van de Ven et a., 2018) and studies (of between 603 and 239 individuals) indicate that a small number of people injecting PIEDs in England and Wales have BBV such us HIV (1.2%), and Hepatitis B (2.7%) and C (4.5%) (Bates et al., 2017). They also report participating in risk behaviours such as sharing needles (13.0% in lifetime) and only 15% of those reporting two or more sexual partners, report always using condoms in the past year. Other research suggests that although the rates of needle sharing is low, PIED users frequently report re-using of needles/equipment, injecting from a shared container (bladders, vials, etc.), injecting other illicit drugs, injecting insulin and targeting small muscle groups (Rowe et al., 2016). Moreover, a UK study found that antibodies to HCV, HBV or HIV (anti-HCV) is reported to be +/-10% among people who inject PIEDs (UK) (Hope et al., 2013), but that testing uptake was poor and there was little awareness of the risks involved amongst this group. Only 14% of PIED-only users with anti-HCV were aware. In addition, a high proportion of people injecting PIEDs experience

injection-related problems. For example, a UK study showed that 42% of people who inject experience injection-related problems, with 6–8% ever experienced an abscess or open wound (Hope at al., 2015).

People who use PIEDs may also be exposed to a number of market risks. For example, PIEDs products (e.g. illicitly manufactured drugs containing AAS, synthetic peptide hormones) that contain pharmacologically active substances products that are untested or banned are also available on the illicit market, and have been found to be adulterated and misbranded (do not contain what the products lists on labels) (Kimerg et al., 2014; Van de Ven, 2016). Moreover, nutritional supplements are also an integral part of many sports and fitness enthusiasts' diets, yet studies have shown that these products can contain a variety of contaminants and that their composition does not always match with what the label specifies (Abbate, et al., (2015; van der Bijl & Tutelyan, 2013; Outram & Stewart, 2015).

Despite such risks, research shows that engagement with health care services among this population can be low (Bates et al., 2017; Pope et al., 2004; Zahnow et al., 2017). For example, analysis of a small number of respondents from the Global Drug Survey (Zahnow et al., 2017), a large online self-selecting sample, found that only 35.23% (n=68) of those using AAS (N=195) reported visiting a doctor when concerned about adverse effects. Reasons for lack of engagement include the perception that health care workers lacked the knowledge and skills required to address AAS user needs effectively; and that accessing healthcare services was viewed as a sign of 'weakness' and as such 'un-masculine' (Bates et al., 2017a; Kimergård and McVeigh, 2014). Those using PIEDs may also compare themselves to those who inject and use other psychoactive substances, which leads to the perception that they themselves are not 'drug users' and do not need support from 'drug treatment' services. Research suggests that specialist drug service workers can be unfamiliar with the substances being injected, and the specificities of injecting practice and risk (Seear et al., 2015). Service provision and the provision of information on AAS use can also vary across geographies (Kimergård & McVeigh, 2014). Moreover, there is a sub-group of individuals who only use AAS orally (van de Ven et al., 2019), and as such mat not come into contact with health care services in those countries where NSPs are the primary point of engagement. Fear of judgement may also mean that those using PIEDs turn to their peers or the internet to obtain information or to seek help, instead of through health care services or formal educational programmes (Kimergård, 2014).

It is therefore important that wider health care services become more accessible for people who use PIEDs such as AAS, including those who do not inject (van de Ven et al, 2019), and that health care workers are equipped to respond and hold knowledge on the various routes of administration and associated harms. Increasing health care workers' awareness and knowledge is essential in order to equip them in identifying use and harms, and to respond in a way that is culturally sensitive and non-judgemental. Such an approach is needed to ensure that those using PIEDs receive suitable healthcare and that credible information is provided that will be acknowledged and accepted by those using PIEDs in attempts to address use and harms (Bates et al., 2017a; NICE, 2017).

Whilst national responses to PIED use varies across Europe, the EU White Paper on Sport (2007) and the "Draft EU recommendations on combating doping in recreational sport' (2014) highlighted the need for a coordinated approach to PIED use, including education and prevention to target populations other than those involved in professional sports such as those engaging with sports and fitness recreationally. Whilst some initiatives aimed at addressing the use of PIEDs in professional sport have been implemented (e.g. https://www.realwinner.org/; https://adel.wada-ama.org/), little has been done to address the use of PIEDs among those who are not involved in professional sport (Backhouse et al., 2014). A recent systematic review (Bates et al., 2017) examined the effectiveness of interventions (N=14) aimed at preventing the use of AAS and other PIEDs. It found that interventions were predominantly educational, delivered in school sport settings, targeted youth athletes and addressed a large range of mediating factors (e.g. ethics and values, harms, healthy alternatives, body image and social norms). The review concluded that the evidence of the intervention components effectiveness was limited and that it was difficult to assess effectiveness due to brief or imprecise descriptions of the intervention content, absence of behavioural outcome measures and the short-term nature of follow-up. Despite such limitations, the authors suggest that interventions that incorporate components in addition to information provision may be more promising and that it is important to develop interventions outside of professional sports and school settings, to reflect the current evidence of use among diverse groups.

A number of prevention and harm reduction initiatives have been implemented that target recreational PIED use, although as suggested by the review of Bates and colleagues (2017), few have been evaluated for their effectiveness (Sagoe et al., 2016). This includes delivery on multi-media platforms, and through the use of e- learning tools. Examples include the *Safe You* app, *Dopinglinkki* e-learning tool(s) (dopinglinkki.fi/koulutus/verkkokoulutukset),

www.eigenkracht.nl and *100% Ren Hardtraning*. However, it is currently unknown to what extent these tools have been adopted by health care providers, fitness industry professionals and others working in professions that may come into contact with those using PIEDs. Furthermore, it is unknown whether these tools might also useful to professionals working in countries outside of the country (or countries) in which they were development and originally targeted. This project evaluated the adaption and pilot implementation of two e- learning tools, the Dopinglinkki and Safe You e-learning tools, to provide insight into their acceptability, usability and utility, with the aim of improving and increasing implementation in order to increase health care worker and fitness industry PIED knowledge and engagement with those that use PIEDs.

2. Aims and objectives

The research explored the adaption and implementation of an online e-learning module (work package 3) and app (work package 4) which were designed to support professional learning in those professionals working to prevent performance and image enhancing drug (PIED) use and harms among recreational athletes and fitness enthusiasts.

To achieve this aim, a number of research objectives were set:

1) To what extent did professionals engage with the tools within their practice, and to what extent would they engage with the tool(s) in their future practice?
2) How acceptable and applicable are the tools to individuals working in different professions who might come into contact with people who use PIEDs (i.e. healthcare providers, fitness industry professionals)?
3) How useable are the tools and does usability differ across professions?
4) What were professional's expectations of the tool and did the tool(s) meet these?
5) What (self-assessed) learning outcomes do professionals believe the tools could support?
6) What factors need to be considered when attempting to implement the tools in future practice?
7) How feasible is follow-on research designed to evaluate the impact of the tools on health care, fitness industries and other relevant target group behaviour?

The research did **not** formally assess the effectiveness of the tools in improving participants' knowledge and professional practice, or in changing PIED user behaviour and health outcomes.

3. Definitions

The following definitions were used in this research:

Performance and image enhancing drugs (PIEDs) are substances that are used in order to improve athletic abilities/performance and/or to enhance physique/appearance. This includes a wide range of substances such as anabolic-androgenic steroids to aid muscular development, or ephedrine to lose weight. People who use PIEDs may also use other substances in a fitness/sport related context such as weight loss drugs, nutritional supplements and drugs used to manage the side effects of PIEDS (e.g. Tamoxifen).

An **amateur athlete** generally competes on a national level, may receive sponsorship (e.g. supplements or training equipment from a company), and usually is associated with a sport federation. In some countries, amateur athletes can be subjected to doping controls.

A **recreational athlete** generally does not compete or will only compete sub-nationally, will not receive sponsorship, and is usually not associated with a sport federation. Recreational athletes in general are not subjected to doping controls (within the partner countries).

Healthcare workers: Individuals who deliver care and services to patients or clients directly in a variety of settings (e.g. hospitals, primary health care center, outpatient clinics) and have direct patient/client-care responsibilities. This includes those currently working with those using PIEDs and those who are likely to come into contact with people who use within their professional practice. This can include those working in the area of physical and mental health.

Fitness industry workers: professionals who work in commercial or municipal fitness centres as managers, group fitness instructors or personal trainers.

4. Description of the tools

4.1. Online e-learning modules

The Dopinglinkki, A-Clinic Foundation have previously developed two e-learning modules focussing on PIED use in recreational sports. The first was initially aimed at health care workers (e.g. GPs) with medical backgrounds and the second at those working in the fitness industry (e.g. personal trainers, group fitness instructors and coaches). The fitness module is part of the Clean Exercise Commitment for Finnish fitness centres, and part of education programmes in nine Fitness Institutes[2] in Finland. Over 650 sports centres have signed the Clean Exercise Commitment in Finland, and educational collaborations exist between Dopinglinkki and the Training Institute for Prison and Probation Services and NSP. The modules were originally available in Finnish and Swedish, but independent of this project, Dopinglinkki has been approached by organisations from different countries, including Baltic and Eastern European countries, to expand their program and to translate it into other languages.

The modules were made available for use and assessment, and translated into the participating countries language (e.g., Dutch, English, Greek, Lithuania), and hosted online by the Dopinglinkki, A-Clinic Foundation. Table 2 provides information on the content of the health care worker module, and table 2 on the fitness industry module.

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[2] These are Centers of excellence for sporting people around Finland and athletes around the world. They provide a wide variety of sports, activities, educational programmes and facilities for professional and amateur sports enthusiasts.

Core content and aims	Complementary knowledge	Specialist knowledge
At the most basic level, the content aims to assist module users in: • defining PIED use for fitness purposes and differentiating it from use in competitive professional and amateur sports • understanding the range of effects, including adverse effects, of the most common PIEDs. • understanding the most common mechanisms of PIEDs action in the human body (e.g. how PIEDs effect the body) • understanding the reasons why different PIEDs are used • assessing the risks posed by PIED use • recognising typical user profiles of PIED users in recreational sports • being able to identify the signs and symptoms of PIED use • knowing the differences between PIEDs and dietary supplements • recognise and challenge the myths that surround PIED use • knowing the long-term effects of PIED use • engaging with PIED users, addressing use and managing interactions in an effective and non-judgmental manner.	The module is designed to assist healthcare workers in: • describing the effects of PIED use in young people and women specifically • understanding why different PIEDs and drugs are used together • recognising issues that cause stigma among those using PIEDs • identifying supraphysiological concentrations of hormones resulting from PIED use • understanding the role of PIED use in fitness as a whole • understanding the motives and functions of PIED use. • ability to be critical towards peer knowledge and to separate it from scientific/expert knowledge • identifying different typologies of PIED use, and identify these in patients/clients • is able to recognize if the patient's underlying motives are to get a PIED prescription from the MD/GP without hypogonadism	The module is designed to assist healthcare workers in: • knowing the national laws that regulate use, possession and importation of PIEDs • understanding how and where PIEDs enter the market • understanding the relationship between body image and social-media, and how this could lead to PIED use.

Core content	Complementary knowledge	Specialist knowledge
The module aims to assist fitness industry workers in: • defining PIED use for fitness purposes, and differentiating it from use in competitive sports • outlining the motives and underlying factors for PIEDs use. • understanding the effects, including adverse effects, of the most commonly used PIEDs • assessing the risks involved in PIED use • distinguishing the myths that surround PIED use from the reality	The module aims to assist fitness industry workers in: • understanding the fitness PIED phenomenon as a whole • ability to be critical towards peer knowledge and to separate it from scientific/expert knowledge • engaging with PIED users, addressing use and managing interactions in an effective and non-judgmental manner. • understanding the motives and underlying factors for using PIEDs • passing on their knowledge to those that use PIEDs to encourage cessation.	The module aims to assist fitness industry workers in: • describing the differing reasons why different PIEDs are used • understanding why different PIEDs and drugs are used together • understanding the laws that regulate use, possession and importation of PIEDs • knowing the most common mechanisms of PIEDs in the human body

Table 2*: Summary of fitness industry module content and aims*

4.2. Safe You fitness app

The Safe You mobile app is a digital learning tool aimed at those working in Greek fitness centres such as personal trainers, group fitness instructors and coaches. The Safe You project (co-funded by the Erasmus+ Sport programme) targets coaches, fitness instructors, young exercisers and amateur athletes (16-25 years old) with an educational tool to help them resist doping use. This project is headed by Aristotle University of Thessaloniki Greece and draws on the knowledge of a consortium of global experts, including senior academics from Kingston University, the University of Rome

Foro Italico and the University of Potsdam in Germany. They also work alongside the German Anti-Doping Agency, the Cyprus Sport Organisation and Greece's Ministry of Culture, Education and Religious Affairs.

The app is a searchable compendium that contains information on pharmaceuticals and nutritional supplements. It aims to provide basic information on PIED categories and substances that people are most likely to use in the fitness sector and gyms or substance they are exposed to through advertisements.

The Safe You app includes four main categories:

- Muscle growth and strength
- Weight loss and fat burner
- Endurance
- Side effect modulators

In each category participants can find a list of substances and in every substance they can find the substance function on the body's systems, the level of risk immediacy, the long-term and short-term impact on health, the WADA status (prohibited at all times, prohibited during competition or out of competition) dosage for medical use and the most common side effects. Substances with unknown or unclear compositions are also flagged as of 'high risk' although the risk here is related to the unknown factor (www.safeyou.eu). Table 3 outlines the core content and aims.

Core content and aims	Complementary knowledge and aims	Special knowledge and aims
At the most basic level, the content of the app aims to assist athletes in: • assessing the level of immediate and long term risks from using prohibited substances • identifying the basic function and the recommended for medical use dosages of the most common PIEDs • understanding the effect, including adverse effects, of the most common PIEDs • identify whether a substance is prohibited by WADA or not	The content also aims to assist athletes in: • Critically evaluating knowledge about PIED use and nutritional supplements obtained from other sources (e.g., internet). • obtaining reliable information on the side effects of prohibited substances • having immediate access to the information related to substance use	In addition, the application aims to assist athletes in: • making informed decisions with respect to substance use • comparing the difference between the recommended for medical use dosages and the dosages for performance enhancement • knowing the most common side effects of PIEDs in the human body

Table 3*: Summary of Safe You App content and aims*

5. Partner participation across work packages

Partners from a number of European countries participated in the project. Table 5 provides an overview of work package and partner participation.

Participating partners

- Greece (Aristotle University of Thessaloniki)
- Finland (Dopinglinkki, A-Clinic Foundation; Folkhalsan Utbildning)
- Lithuania (anti-Doping Agency)
- The Netherlands (The Mainline Foundation)
- United Kingdom (Public Health institute, Liverpool John Moores University)

Research work package	Tool	Target group	Methods	Participating countries
3	e-learning health professionals module	Health professionals	Tool testing, survey and interviews	Finland The Netherlands United Kingdom
4	e-learning Fitness industry module	Fitness professionals	Tool testing, survey and interviews	Finland Lithuania Greece
	Safe You app	Fitness professionals	Tool testing, survey and interviews	Greece

Table 4*: Research work packages and partner participation*

5. Methodology

A standardised two stage, mixed methodology was designed by LJMU and implemented by each partner in their own country. This incorporated an online survey, and individual structured interviews with tool users to assess participants' experiences of using each tool (i.e. health care worker e-learning module, fitness industry e-learning module, Safe You app).

5.1. Stage 1: Tool user-testing and self-reported questionnaire(s)

Stage 1 of both work package 3 and 4 consisted of participants completing the tool as a potential user and then completing a self–report online questionnaire to assess the acceptability, usability and utilisation of the online e-learning module(s) (WP 3) and Safe You app (WP4), participant engagement with the tools and self-assessment of learning outcomes among health care providers and fitness industry representatives. Three independent

surveys were implemented that allowed us to address each objective across the three tools, whilst addressing specific issues relevant to the content of each individual tool.

5.1.2   Recruitment and sampling

Convenience and purposive sampling was used in each country to recruit participants. Sampling frames were existing contacts, professional networks, and gatekeeper networks Recruitment was conducted electronically, using a standardised email template and adapted for each country (see Appendix). All participants were provided with a study information sheet but adapted by each partner (see Appendix). Consent for completing the tools and the survey was implied, with participants confirming their willingness to participate within the survey.

A target response rate was not established prior to recruitment as a minimum sample size for each country depended on factors such as the size and structure of the PIED field, the size of partner networks, and ease of access. A total of 133 individuals took part across the surveys. Table 5 outlines the response rates for each survey.

Country	Health care worker e-learning module survey	Fitness industry e-learning module survey	Safe You Fitness industry app survey
UK	20	n/a[1]	n/a
The Netherlands	20	n/a	n/a
Finland	21	17	n/a
Lithuania	n/a	14	n/a
Greece	n/a	21	20
Total number of participants	**61**	**52**	**20**

[1] n/a indicates partner did not take part in testing of this tool

Table 5: Survey completions

5.1.3 Overview of the survey(s) components

E-learning module(s) health professionals and fitness industry

The surveys were designed by LJMU in collaboration with all partners. Content was informed by previous research (e.g. McVeigh and Begley, 2017), the project research aims and objectives, and included items based on the Theoretical Framework of Acceptability (TFA) (Sekhon et al., 2017). The TFA is a multi-faceted construct of acceptability which measures the extent to which people delivering or receiving a healthcare intervention (i.e. The PIED tools) consider it to be appropriate to their professional practice. Whilst the TFA informed the survey design, the research was not designed to test the utility of the TFA theory *per se.*

Each survey differed slightly to address different national contexts (e.g. PIED laws) and the content and purpose of each individual tool, but all shared a number of key components. These included*:*

- *About you***:** This section collected information on demographics, education, training, professional characteristics such as role, and experience of working with people who use PIEDS.
- *About your clients/patients***:** This section asked about beliefs on the extent and nature of PIED use among their client/patient group (e.g. type of PIEDS used, motivations for use).
- *Current PIED practice*: This section asked about current practice responses to PIED use, what actions participants thought should be introduced, previous training received, and levels of engagement in PIED prevention and harm reduction.
- *PIED use and harms***:** This section assessed participants' awareness of the various adverse health effects of PIED use, and which they had encountered amongst clients/patient.
- *Current sources of PIED information*: This section asked about participants' perceptions of the sources of information they referred to.
- *PIEDs and society***:** This section aimed to gain insight into participant's general views on PIED use. The TFA highlights the importance of gaining insight into participants' values regarding the issue in question (i.e. PIED use, perceptions on acceptability of use and legal status), and how that compares to the objectives of the intervention (e.g. to prevent use and harms).

- **Experience of using the tool**: This section was informed by the TFA, and included questions asking about experiences of using the PIED e-learning tool/app. For example, if they felt the content was credible, believable and useful, easy to use, if they would get organisational support to use it, whether they would recommend it to a friend or colleague and if they intended to use the tool in the future.
- **Self-assessment of learning goals and e-literacy**: This section measured self-assessed learning based on the core learning objectives of the tools, and general skills in obtaining information via the internet.
- **Additional information**: This section provided the option for participants to provide any additional comments related to their experience of using the tool(s).

5.1.4. Survey data analysis

Survey data was downloaded from the host server (onlinesurveys.ac.uk). As each partner country's surveys were hosted as independent surveys, data was combined for each survey type (i.e. Safer You, and healthcare/fitness modules) with country code added as a new variable. Data was analysed using descriptive statistics using SPSS (v26). Open text responses were extracted and analysed separately, and considered alongside the interview data.

5.2. Stage 2: Structured interviews

Stage 2 of both WP3 and 4 consisted of structured interviews with a sub sample of survey participants to gain further insights into their experiences of completing the tool(s).

5.2.1 Sampling and recruitment

Participants were recruited from those completing the online questionnaire(s) in stage 1. They were given the option to opt into the interviews in the online survey and all those completing the survey were followed up electronically via email and telephone. A standard email invitation template was created and adapted by each partner (see Appendix). All participants were provided with a study information sheet (see Appendix 5) and provided written consent (see Appendix). We aimed to recruit a maximum of 10 interview participants that were representative of the professions completing the survey. Table 6 outlines the response rates for each tool.

Country	Health care worker e-learning module survey	Fitness industry e-learning module survey	Safe You Fitness industry app survey
UK	8	n/a	n/a
The Netherlands	10	n/a	n/a
Finland	10	4	n/a
Lithuania	n/a	10	n/a
Greece	n/a	10	10
Total	**28**	**24**	**10**

Table 6*: Number of survey participants*

Interview schedule components

A standard structured interview schedule was prepared. Schedule design and data analysis was informed by the project aims and objectives, and as with the survey, the TFA. In addition, Normalisation Process Theory (NPT) (Murray, 2010) was referred to. NPT was developed as a way of explaining how a new practice or intervention is implemented, and how it might enter routine practice. It is not a methodology *per se*, but provided a useful framework to explain how variations in implementation of the tools might be shaped by factors and interactions at play within local delivery systems (e.g. health care services) and according to practitioner agency and experience. As with the use of the TFA in stage 1, core concepts from TFA and NPT informed the interview schedule design, but the research did not test the theories. Each interview schedule differed slightly to address the content and purpose of each individual tool, but all included a number of components. This included the following sections*:*

- *Current practice***:** This section included questions about participants' current role, experience of working with people who use PIEDs, their main source of information/learning on PIEDs, whether they had undertaken previous training or learning on PIEDS and related issues, previous use of e-learning, how the tool differed to, and/or resembled, other learning approaches to PIEDs, whether the aims

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of the module to prevent PIED use and harms fits within the goals and activities of your profession.

- **Completing the module:** This section asked whether they completed the module and if not, why, the amount of time it took to complete, whether they had access to the digital devices to allow for the use of the tool within their work place, what additional effort to their normal work completing the module involved, what their expectations of the tool were and if they were met.

- **Module content:** This section asked whether the content was clear and easy to understand, appropriate and useful for their professional role, perceived to be credible and what content, if any, did they feel was missing from the tool.

- **Module impact:** This section aimed to gain insight into the perceived impact of the tool. It asked what benefits they felt would arise from using the module and to whom, how the tool would benefit themselves and whether it filled any gaps in knowledge, and what benefits the tool may have to patients/clients.

- **Future implementation:** This section asked a number of questions with the aim of gaining insight into future implementation of the tools within their profession. It asked whether they felt that senior management within their organisation would support the use of the tool, what barriers may prevent the tool being implemented and used in their profession and what changes (e.g. at the individual and organisational level, and to the tool itself) they felt were needed to facilitate the effective future implementation of the module in their workplace. Participants were also asked whether they felt use of the tool could become routine practice in their profession.

- **Additional information:** This section provided the option for participants to provide any additional comments related to their experience of using the tool(s).

5.2.2. Qualitative data analysis

Each participating partner undertook a thematic analysis (Braun and Clarke 2006; 2014) of their interview data and submitted the data to LJMU for cross comparative synthesis. A step-by step guide to conducting thematic analysis was provided, an example of a transcript coded provided, and training provided by LJMU in person and via email. Analysis was conducted in Excel and guided by a pre-designated thematic analysis framework provided by LJMU, which was informed by the TFP and NPT concepts. Thematic analysis was chosen as it is a flexible and well established approach that provides robust analysis that can be presented in an accessible way to those working outside of academia including practitioners and policy-makers (Braun and Clarke 2006; 2014). An overview of the step by step process of coding is provided below:

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1. Partners familiarised themselves with the data through 'active reading' of the interview transcripts and to assess which sections were "on-topic" (i.e. relevant to the research aims and objectives, and pre-determined coding frame). During this stage, any additional patterns related to the research questions, or any that were unique to the cultural context of each country, were identified.

2. Once partners had familiarised themselves with the data and identified 'on-topic' data, the pre-determined coding frame was systematically applied, and data extracted into each pre-determined code within excel. Each country submitted their completed coding in Excel to LJMU for further analysis

3. LJMU sorted and grouped the codes (pre-determined and new codes developed by each partner) into broad themes and sub themes.

4. Themes were reviewed and refined and similarities and differences across countries were considered.

5. Final names and definitions of the themes and sub themes were established. At this point, care was taken to ensure that the theme provided a detailed story that reflected the research aims and objectives, and that the narrative adequately reflected the findings of each individual country.

6. The results of the thematic analysis were written up to provide an analytical narrative that addressed the research aims and objectives. Verbatim quotes were used to exemplify the essence of each theme, in a way that highlights similarities and differences across countries.

7. The narrative account was then combined with the survey data analysis to create a list of recommendations that present a number important considerations for the future (effective) implementation of the tools.

5.3. Ethical approval

Where appropriate, ethical approval was obtained from relevant bodies (e.g. University Research Ethics Committees) for all stages of the project.

7: Research findings

7.1. Work package 3: Health care professionals

7.1.1. Survey results

Participants

As data were collected from three countries (Finland (FI); Netherlands (ND); United Kingdom (UK)), for readability, combined results are presented in the narrative, with country breakdowns in accompanying tables where relevant. Statistical comparisons between countries are not provided because of differences in sampling and the sample (e.g. professional background, prior experience of working with PIEDs). Missing data is reflected in the % reported.

In total, data from 61 participants was included in the analysis (FI = 21, 11 male; ND = 20, 11 male; UK = 20, 13 male). 20 described themselves as healthcare professionals (including nurses, doctors/physicians, specialists), 19 were drug/alcohol workers; 2 policy makers. The remaining occupations included medical and nursing students, police, and health promotion workers. They had worked a mean of 10.3 ± 9.3 years in their occupational field (range 1-40 years); and all had at least a University degree or equivalent professional/vocational qualifications (20 medical degrees, 1 PhD). Five reported having obtained specialist qualifications related to PIED use (sports science and coaching related qualifications).

Nineteen participants (31.1%) had previously worked with people who use PIEDs, although 22 (36.1) suspected that some of their clients used these substances, but this had not been confirmed.

In these respondents, they estimated they had worked with approximately 75.6 ± 180.7 (median 5; range 0-800) people who used PIEDs in the previous 12 months, and a mean of 38.8 ± 88.7 of these were also recreational athletes (mode 5; range 0-400).

Other backgrounds where PIED use was suspected/confirmed included fitness enthusiasts (total mentioned n = 28); amateur athletes (n = 18); professional/elite athletes (n = 9); competitive bodybuilders (n = 16); and non-competitive bodybuilders (n = 29); There was the perception that injection of PIEDs took place, but there was a wide range of estimates, ranging from 0% to 100% of clients encountered. Twenty two (35.5%) participants had

observed an increase in the number of adults using PIEDs, whilst 11 (17.7%) reported this for clients aged under 18s as well. Where specified (n = 28), all participants reported that PIED users were identified through client self-disclosure (n = 5). Twenty six participants (51.1%) reported that they would encourage clients to cease PIED use if this had been identified; 14 would not (27.5%), with the remaining answers given (n = 11; 21.6%) stating that this would depend on the client's circumstances and discussions around PIED use practices, objectives of PIED use, a client's own desire to cease use, or experiences of harm.

Thinking of their client group more generally, participants were asked to report the reasons they thought people used PIEDs. In descending order of frequency of reporting (participants could endorse several categories) these were: developing body image/aesthetics (n = 31; 12.3% of mentions); to aid non-competitive bodybuilding (n = 29; 11.5%); to improve self-esteem (n = 28; 11.1%); because of body image disorders (n= 21; 8.3%); because of social-norms around masculinity (n = 20; 7.9%); muscle growth and strength (n = 20; 7.9%); weight loss (n = 13; 5.1%); to improve sexual attractiveness (n = 18; 7.1%); competitive bodybuilding (n = 18; 7.1%); for hormone replacement therapy (n = 10; 4.0%); and to support occupational performance (n = 7; 2.8%).

A minority of respondents (n = 25; 41.0%) thought that use of PIEDs in sport should be an offence; whilst only 15 (26.3%) thought possession should also be prohibited. Only one person (2.9%) thought the predominant response to PIED use should be criminal justice led, with most thinking a public health approach was preferable (n = 20; 57.1%) or anti-doping (n = 13; 37.1%) approaches were preferable. Respondents were asked to rate the acceptability of PIED use by particular groups (rated 0 = very acceptable to 10 = not acceptable at all). There were no notable differences between reference groups, but highest mean scores, indicating lowest acceptability, were provided for professional/elite athletes (5.9 ± 3.2) and females (5.9 ± 2.9) and males (5.9 ± 2.7) in general, followed by amateur athletes (5.6 ± 2.9);young people (5.6 ± 3.3); competitive body builders (5.4 ± 3.9); recreational athletes (5.3 ± 3.2); non-competitive body builders (5.3 ± 3.7), and fitness enthusiasts (5.1 ± 3.4).

Thirty seven participants (60.7%) reported that they required information or training on PIED use prior to completing the module; 28 (45.9%) had actively sought out information, and 17 (27.9%) had received training on use and associated harms. Thirty one (50.0%) had previously used apps or e-learning tools for self-directed learning. Sources of information and training included information identified after internet searches (including specialist, and non-specialist sites such Wikipedia), specialist books, scientific research articles, and discussions with fellow professionals. Training took the form of conferences, lectures and seminars, and well as taught components of (non-specialist) University Modules.

Participants were asked to report all those PIEDs that they were aware of, or thought were used by their clients. Data is presented in Table 7 below.

	Aware of PIED (%)	Believed to be used by clients (%)	Neither (%)
Oral steroids (e.g. Methandrostenolone (Dianabol), Oxandrolone (Anavar), Oxymetholone (Anapolan 50))	25 (40.3)	19 (30.6)	18 (29.0)
Estrogen control and post cycle (e.g. Nolvadex (Tamoxifen citrate), Clomid (Clomiphene citrate))	26 (41.9)	14 (22.6)	22 (35.5)
Fat loss and other drugs (e.g. Ephedrine, Dinitrophenol (DNP), Liothyronine (T3))	31 (50.0)	12 (19.4)	19 (30.6)
Injectable Steroids (e.g. Testosterone Enanthate, Equipoise (Boldenone), Deca-Durabolin (Nandrolone))	26 (41.9)	22 (35.5)	14 (22.6)
Peptides and other hormones (e.g. Human Growth Hormone, IGF (Insulin-like growth factor 1))	25 (40.3)	18 (29.0)	19 (30.6)

Table 7 *Awareness of different categories of PIEDs.*

Data on interventions respondents used in their current role, or would like to use in future are presented in Table 8 below. Six participants (9.7%) also provided blood tests and feedback. Nineteen participants (41.3% of participants providing an answer to this question N = 46) believed that there were barriers to engagement activities with people who use PIEDs, and the reasons given for this included negative societal attitudes/stigma; co-location of PIED clinics for those using other drugs; clients perceiving a lack of specialist support available; an poor access to clinics (e.g. outside of working hours as people who use PIEDs would typically be employed).

Intervention	Use in current role (%)	Would like to use in future (%)	Neither (%)
General health promotion (e.g. nutrition, physical exercise, sleep)	32 (51.6)	13 (21.0)	17 (27.4)
Education/information to increase knowledge on use and harms	25 (40.3)	23 (37.1)	14 (22.6)
Psychological interventions (e.g. CBT) to change use behaviours	9 (14.5)	24 (38.7)	29 (46.8)
Development of skills in users to reduce use, harms, and to promote healthier alternatives to PIED use	15 (24.2)	27 (43.5)	20 (32.3)
Activities aimed at changing social norms and peer expectations on PIED use	10 (16.1)	26 (41.9)	26 (41.9)
Activities aimed at changing social norms and peer expectations around appearance and body image	6 (9.7)	28 (45.2)	28 (45.2)
Techniques (e.g. motivational interviewing; brief interventions) to help clients self-regulate their behaviour (e.g. goal setting, self-monitoring)	23 (37.1)	15 (24.2)	24 (38.7)
Information aimed at developing positive morals and values (e.g. fair play)	16 (25.8)	21 (33.9)	25 (40.3)
Provision of injecting equipment	18 (29.0)	15 (24.2)	29 (46.8)
Drug testing of clients	11 (17.7)	15 (24.2)	36 (58.1)
Drug checking service (i.e. analysis of chemical composition of PIED)	4 (6.5)	22 (35.5)	36 (58.1)

Table 8 *Current intervention practice*

Considering their own role in supporting clients around different health topics, participants were asked to rate how much they believed that their clients trusted their knowledge and the advice that they provided (scored from 1 to 10, where 10 was knowledge and advice were judged to be 'extremely good).

Mean score for PIEDs was 5.2 ± 2.4. For other topics scores were, alcohol 7.7 ± 8.0; illicit drugs 7.2 ± 2.1; fitness in general 5.0 ± 2.6; weight lifting and body building 4.0 ± 2.6; and health and disease in general 7.6 ± 1.6. Overall, on a scale from 0 (not confident) to 10 (very confident), respondents reported a mean score of 6.5 ± 1.8 (range 2-10) with respect to confidence in responding to the needs of those using PIEDs in their professional roles.

Using the Healthcare professional module

Fifty six (91.8%) participants reported that they had completed the module, whilst 5 (7.1%) began it, but didn't finish due to not having enough time. Thirty one (50.8%) completed it in their free time, whilst 18 (29.5%) completed it in worktime and 12 (19.7%) used both their free and work time to test it. Time spent using the module ranged from 25 minutes to 7 hours. Seventeen participants (28.3%) reported that they thought it took *too long* to complete the module.

Answers to module utilisation questions are summarised in Table 9 below. Individual items were rated from 1 (totally disagree) to 5 (totally agree). Overall, there was agreement across all four domains that the module was easy to access and use; it would improve performance; was easy to understand the content, was enjoyable and interesting to use, and would be supported by the organisation. However, there was less agreement that participants would be likely to use the module again over the next 12 months. There were no notable differences between countries, although a fewer ND reported being less likely to receive peer approval for use of the module.

	Mean ± SD	FI Mean ± SD	ND Mean ± SD	UK Mean ± SD	Difference between countries? (p value)[1]	Post hoc differences[2]
Performance expectancy						
The tool would be useful to me in performing my job	3.9 ± 0.9	3.8 ± 1.0	3.7 ± 0.8	4.3 ± 0.9	0.058	-
Using the tool would enable me to meet my training needs more quickly	3.7 ± 1.0	3.6 ± 1.1	3.2 ± 0.9	4.2 ± 0.7	0.007**	ND v UK
Using the tool will increase my ability to respond to client needs	3.9 ± 1.0	3.9 ± 1.0	3.7 ± 1.0	4.0 ± 0.7	0.605	-
Using the tool, I will increase my chances of demonstrating professional competence on PIEDs	4.1 ± 0.9	4.0 ± 1.0	3.8 ± 0.8	4.4 ± 0.8	0.050	ND v UK
Effort expectancy						
The information in the tool was clear and easy to understand	3.9 ± 1.0	4.4 ± 0.6	3.5 ± 1.0	3.6 ± 1.2	0.007**	FI v ND; FI v UK;
Overall, I found the tool easy to use	4.0 ± 1.0	4.2 ± 0.8	4.1 ± 0.8	3.8 ± 1.2	0.387	-
I found the tool enjoyable to use	3.9 ± 1.0	4.2 ± 0.8	3.8 ± 0.9	3.6 ± 1.2	0.140	-
I found the tool interesting to use	4.2 ± 0.9	4.3 ± 0.7	4.2 ± 0.7	4.0 ± 1.2	0.499	-
Social influence						
People who influence my professional behaviour would think that I should use resources like the tool	3.1 ± 1.3	3.6 ± 1.0	2.2 ± 1.1	3.6 ± 1.2	0.000***	FI v ND; ND v UK
The senior management of my organisation would support my use of the tool for my training and practice needs	3.3 ± 1.4	3.1 ± 1.5	2.9 ± 1.2	4.1 ± 1.3	0.011*	ND v UK
In general, my organisation would support use of the tool	3.6 ± 1.3	3.2 ± 1.6	3.2 ± 0.9	4.3 ± 1.2	0.009**	FI v UK; ND v UK
Facilitating conditions						
I have the technological resources necessary to use the tool	4.5 ± 1.0	4.5 ± 1.2	4.5 ± 0.7	4.5 ± 1.0	0.971	-
I have the technological knowledge necessary to use the tool	4.3 ± 0.9	4.4 ± 1.1	4.4 ± 0.7	4.2 ± 1.1	0.817	-
The tool is not compatible with other training and practice development approaches I use	2.2 ± 1.4	2.2 ± 1.6	2.3 ± 1.4	2.2 ± 1.5	0.984	-
Behavioural intention						
I intend to use the tool in the next 12 months	2.7 ± 1.7	1.8 ± 2.1	2.6 ± 1.4	3.7 ± 1.3	0.002**	FI v UK;
I predict I would actually use the tool in the next 12 month	2.7 ± 1.8	1.8 ± 2.1	2.7 ± 1.4	3.8 ± 1.3	0.001**	FI v UK

Additional questions						
I would recommend the tool to a colleague	4.0 ± 1.0	4.5 ± 0.6	3.4 ± 1.0	4.2 ± 1.1	0.001**	FI v ND; ND v UK
I think the information included in the tool is credible	4.5 ± 0.7	4.6 ± 0.5	4.4 ± 0.7	4.5 ± 1.0	0.705	-
I think the case studies included in the tool were believable	4.1 ± 0.9	4.4 ± 0.7	3.9 ± 0.8	4.1 ± 1.1	0.128	-
The case studies included in the tool were similar to people I might encounter in my work	3.5 ± 1.3	3.2 ± 1.6	3.5 ± 0.8	3.8 ± 1.3	0.374	-
I think the expert videos included in the tool were believable	4.2 ± 1.0	4.3 ± 1.1	4.3 ± 0.7	4.1 ± 1.0	0.677	-
I think the expert videos included in the tool were useful	3.9 ± 1.1	4.1 ± 1.1	4.1 ± 0.8	3.6 ± 1.2	0.225	-
I think the information included in the tool is useful	4.2 ± 0.8	4.4 ± 0.6	4.3 ± 0.8	3.6 ± 1.2	0.259	-
I think the information included in the tool is too long	2.9 ± 1.4	2.1 ± 1.5	3.3 ± 1.2	3.3 ± 1.2	0.009**	FI v ND; FI v UK
I think the tool provides too much information	2.8 ± 1.6	1.8 ± 1.6	3.5 ± 1.4	3.2 ± 1.4	0.001**	
Using the tool will enhance current approaches to PIED use within my profession	3.7 ± 1.0	3.8 ± 0.8	3.4 ± 0.9	4.0 ± 1.0	0.070	-
I would be prepared to invest time, energy and work in using the tool in future	3.7 ± 1.1	3.8 ± 1.1	3.2 ± 1.1	4.1 ± 1.1	0.042*	-

[1] * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; [2] Bonferroni post hoc to correct for multiple comparisons

Table 9 *Experiences of using the Module.*

Participants were asked to reflect on the intended learning outcomes of the module, and how they thought it would help other people in similar professional roles. These findings are summarised in the Table below (Table 10). It was believed that the module would be useful across all outcomes, with very few people believing that the module held very little value for the specified outcomes. For individual countries, the distribution generally followed the same pattern. However, in the UK, more people endorsed that the Module would help *very much* with understanding effects of PIEDs (50%); describe the purposes of PIEDs (50%); define fitness doping and differentiate it from doping use in competitive sports (55.0%); and understand some of the long term adverse effects of PIED use (55.0%)

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Learning outcomes	Percentage endorsing response (N = 60)				Percentage endorsing *quite a bit* or *very much* in each country (n)		
	Very little	**Somew hat**	**Quite a bit**	**Very much**	**FI (21)**	**ND (19)**	**UK (20)**
Engage with a person who uses PIEDs	0.0 (0)	26.7 (16)	56.7 (34)	16.7 (10)	76.2 (16)	55.0 (11)	85.0 (17)
List a range of effects and adverse effects of the most common PIEDs	3.4 (2)	16.7 (10)	46.7 (28)	33.4 (20)	76.2 (16)	78.9 (15)	85.0 (17)
Understand the mechanisms of action of the most popular PIEDs in the human body	1.7 (1)	21.7 (13)	56.5 (34)	20.1 (12)	80.9 (19)	63.2 (12)	80.0 (16)
Describe the purposes of different PIEDs	1.7 (1)	10.0 (6)	55.0 (33)	33.3 (20)	58.1 (12)	78.9 (15)	90.0 (18)
Assess the risks of PIED use	1.7 (1)	8.3 (5)	58.4 (35)	31.7 (19)	90.5 (19)	89.5 (17)	90.0 (18)
Understand motivation of PIED use in recreational sports	1.7 (1)	8.3 (5)	48.3 (29)	41.7 (25)	95.2 (20)	84.2 (16)	90.0 (18)
Identify the signs and symptoms of PIED use	3.4 (2)	13.3 (8)	48.3 (29)	35.0 (21)	81.0 (17)	84.2 (16)	85.0 (17)
Know the differences between doping substances and dietary supplements	1.7 (1)	16.7 (10)	53.3 (32)	28.4 (17)	76.2 (16)	78.9 (15)	90.0 (18)
Define fitness doping and differentiate it from doping use in competitive sports	0.0 (0)	21.7 (13)	45.0 (27)	33.3 (20)	80.9 (19)	63.2 (12)	90.0 (18)
Identify some of the myths regarding fitness doping	0.0 (0)	18.3 (11)	63.4 (38)	18.3 (11)	90.5 (19)	73.7 (14)	80.0 (16)
Understand some of the long term adverse effects of PIED use	0.0 (0)	6.7 (4)	53.3 (32)	40.0 (24)	95.2 (20)	94.7 (18)	90.0 (18)

Table 10 *Self-reported learning outcomes*

7.1.2. Interview findings

Health professional interviews

A total of 27 interviews were conducted with health care workers who completed the health professional module. The module was developed by The Dopinglinkki, A-Clinic Foundation in Finland and was initially targeted towards primary and secondary care physicians. The modules were made available for use and assessment in partner countries, and translated into the participating countries language (e.g., Dutch, English). Some text was amended to fit the cultural context of each country (e.g. overview of the legality of use, prevalence of use), but generally the content remained in its original form. The professional background of the individuals taking part differed across countries. In Finland primary and secondary care medical professionals were targeted to complete the module and participate in the research. Participants included licenced physicians/doctors (n = 3), a doctor specialising in addiction medicine (n = 1), a dermatologist (n = 1) and medical students (n = 5). Most (n = 8) had no prior experience of working with patients who used PIED, no prior training and limited knowledge. In the Netherlands and the United Kingdom (UK), those working within the broader field of health care participated. Participants from The Netherlands (n = 10) were from more varied backgrounds and included those working in law enforcement (n = 1, i.e. police officer working within an 'anti-doping' project), those working in health and medicine (n = 5 i.e. physician in addiction, nurse in addiction services, nurse in sexual health, psychosocial therapist, sports dietician), social work (n = 2 i.e. social workers with nursing responsibilities), and consultancy (n = 1, i.e. author of PIED publications and consultant to athletes). Most (n = 6) had subject knowledge and prior experience of working with clients using PIEDs within their professional practice. In the United Kingdom (n = 7), the interviews were conducted with substance use and needle exchange workers (n = 5), a policy maker (i.e. commissioner of substance use services) and a sports psychologist. All had subject knowledge in the area and experience of working with people who use PIEDs within their professional practice.

Module coherence, effectiveness and compatibility

We explored how participants described the tool and its purpose, their expectations, whether it provided a coherent and distinct learning intervention, its perceived effectiveness and whether it was compatible with existing work practices.

Describing the module

How participants described the module varied depending on their professional background. There was more clarity from Finnish participants from primary and secondary medical care who felt that the module provided a '*comprehensive*', '*extensive*' (*Licensed physician, 1)* and '*condense*' (*Medical student, 1*) course about *'doping'*, the differing PIEDs and their effects. There was consensus that the module aimed to '*increase knowledge*' (*Licensed physician, 2*) and provide practical information to inform doctors and physicians on how to identity those using PIEDS and how to interact and respond to PIED use within their practice (i.e. '*how to recognize and intervene as a doctor'*, *Medical student*, 2). Such coherence in the way in which Finnish participants defined and understood the module reflects how it was originally designed to target the medical physicians.

Despite some agreement among those working within the wider health care setting (e.g. substance use and needle and syringe exchange workers) that the module provided a *'chronological' (Policy maker, UK) or 'a-z' (Needle and syringe exchange worker, UK)* of information on '*all facets of PIED use'* (*Social worker with nursing responsibilities, The Netherlands*), with the aim of *'increasing knowledge' (Policy maker, UK)* there was less discussion of the practical usage of the module within their practice. As shown in quote 1 and 2, instead the module was felt to *offer 'scientific background' from a 'clinical'* perspective (*PIED harm reduction service, UK),* which they did not feel was required within their profession and as such had little practical application. Whilst those who held a certain level of prior knowledge were able to dissect and see the usefulness (i.e. '*Very informative'*, Nurse in addiction service, The Netherlands) of such content, it was generally felt that the module would 'o*verwhelm*' those who did not hold a '*certain level of medical background knowledge' (Nurse in addiction service, The Netherlands*). Thus, it would appear that the scientific basis of the module might act as a barrier to its implementation, acceptance and usefulness among those working in broader health professions (see barriers section).

Quote 1

'It's there to give you the scientific background…it's quite clinical and it's quite medical, so that's come from a high background, how it synthesises through the skin into the muscles and through to the organs, and all that, and then the output of it. So that bit is quite technical. But I think in terms of the message and the different types of drugs, and how it's broken down, I do think it's quite easy to see the objectives of what it is and try to learn about it, so it does give people that knowledge'

(*PIED harm reduction service, UK*)

Quote 2

'My first impression was not very positive. That is why I initially stopped doing the course. Later I started again. Once I was a bit further in the course it became increasingly easy to do it, and I could finish it, and even successfully did the exam. The beginning is quite tough, with all the medical terms. Later in the course this was less the case. I thought: "I don't need to know all this information, I just want to be able to work with people that use or abuse those substances"'

(Independent psychosocial therapist, The Netherlands')

Expectations

Differences in how participants described the modules purpose where reflected in their expectations of the module and the degree to which they felt the content was clear and relevant. Finnish physicians felt that it was clear and accessible and reported clear expectations that focussed on increasing knowledge and gaining practical information that they could apply within their day to day practice (' *I wanted more information [on PIEDS]...I expected to get practical tips and information, Licenced physician'*, 1). Some medics felt that the module had exceeded their expectations by providing a more '*extensive'* (*Medical student, 3)* and 'comprehensive' (*Medical student, 4*) course than they had anticipated ('*assumed it to be shorter/less extensive [it was a] positive surprise that it was so extensive'* *(Medical student, 3).* However, one participant disagreed and had expected the module to be

shorter and more concise and felt that they would have benefitted if this had been the case (Licensed physician, 2).

In comparison, those working within the wider health care sector, described vague ('*Just to learn more about PIED's*', *Social worker/ sexologist, The Netherlands*) expectations, or not having expectations prior to completing the module ('*I didn't really have much expectations*', Nurse, The Netherlands). Despite this, generally, all participants reported '*learning a lot*' from the module (*Sexual health nurse, The Netherlands*) and those that reported having '*lower expectations of the course*' were pleased these had been '*surpassed*' *(PIED author/consultant to athletes, The Netherlands) and 'exceeded' (Nurse in addictions service, the Netherlands)*. Moreover, some assumed that the content would be overly negative in tone ('*Social worker/ sexologist, The Netherlands*'), but were pleased to find that the module took a more '*balanced*' approach (*Sexual health nurse, The Netherlands*) and was '*more neutral/pragmatic than [they] expected*' (Social worker/sexologist, The Netherlands). As shown in quote 3 (and 2 above), when discussing their expectations, the depth of the module was discussed in a way that suggested that although this may be off putting (e.g. '*intimidated*') to those working within broader health care, and that the information was not easy to recall, they valued the content and extracted an applied relevant pieces from the variety of information provided. However, others highlighted that some content that was felt to be essential within their profession such as harm reduction messages (see Compatibility) were limited, and as such the module had not met their expectations.

Quote 3

'It exceeded my expectations. The module was very extended. First of all, I did not know there were so many different substances. Secondly, I expected a more general discussion of PIED use, but this e-learning actually was far more extensive. However, I was also a bit intimidated and thought "no way I am going to do the exam"; in that case, I would have to study the content more. I read everything, but I cannot retell the exact content. Then I would have to dedicate more time to the course. I don't think there is an overload of information. As a reader you can also pick out the main points'

(Nurse in addictions service, The Netherlands).

Distinctiveness

Compared to those working in the broader health field, other than receiving lectures on nutrition and pharmacology as part of their training and one medic recalling a lecture on PIED use, the majority of medics did not have prior knowledge of PIED use and had not engaged with other sources of PIED information. They had not received prior training in the area and were motivated to participate in the module as part of their self-directed learning. As such, they were not able to compare the module to other interventions/sources ('*There aren't any other modules available', Dermatologist*), which meant that the module provided a new and distinct resource that they could consult to increase their knowledge on PIED use and related harms. Thus, there appeared to be a clear need and want for a learning resource such as the e-module among primary and secondary care physicians.

Those from the wider health field described engaging with a wide range of sources to increase their knowledge on PIEDS as part of their self-directed learning. These varied from searching and engaging with scientific literature and research, seeking out lectures and tutorials available on YouTube and applying information on harm reduction materials/posters they were exposed to within their practice, to searching anti-doping and PIED websites (e.g. UKAD (UK), WADA and Dopinglinkki; IPEDinfo.co.uk), engaging with 'body building' and PIED online forums, and generally searching the internet and Wikipedia. They also discussed learning from peers within their everyday practice, and also valued PIED professional forums/networks (i.e. The Human Enhancement Drugs Network (see https://humanenhancementdrugs.com/hednetwork)) as a way of learning from peers and keeping up to date with emerging issues and resources. UK participants also reported attending conferences and undertaking in house training on PIEDs and harm reduction more generally (e.g. safe injecting) that could be applied to their work with people who use PIEDs. Many raised concerns regarding the credibility and reliability of the variety of PIED information available on PIEDs ('*there's not as many reputable sources of information around IPEDs that there needs to be'*, PIED hard reduction services, UK), particularly on the internet. However, online sources such as IPEDinfo.co.uk were particularly valued and regarded as credible and useful. None reported undertaking any formal or accredited training, or use of online modules/courses, making the e-module distinct in this regard.

Whilst the module was regarded as providing 'similar' content to that of other sources they had engaged with, as discussed, many felt that the module was '*more scientific'* and '*extensive*` (quote 5). Others felt that although it differed in its scientific depth, this level of

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detail was unnecessary. As exemplified in quotes 4, all felt that the module was *'credible'* and was an improvement on the existing sources they had previously used, yet it was suggested that including references within the text would enhance the perceived credibility of the content (*Addiction physician, The Netherlands*). Moreover, as highlighted in quote 6, some felt that although the module was '*a big step forward'*, there were still inaccuracies that required amending before it is rolled out more extensively (see *Barriers and future implementation*). Generally, participants felt that the module would '*compliment*' and not replace the use of other sources used in their self-directed learning.

Quote 4

'Yeah it came across credible as far as I could interpret that. I didn't come across things that made me question the credibility'

(Social worker with nursing responsibilities, The Netherlands)

Quote 5

'Some of the information was similar, but it was new just because it was a lot more scientific'

(Policy maker, UK)

Quote 6

'What I saw of the module I found a big step forward though but certain areas were inaccurate and dated. They either didn't reflect current knowledge or current user patterns. Having said that it is a massive step forward from what is currently available and would have a significantly positive impact over the current situation'

(Self-employed harm reduction service lead, PIED user)

Perceived effectiveness (potential)

Whilst the research did not measure the effect of the module on participants' knowledge and professional practice, we were interested in the anticipated effectiveness. There was consensus across professions that completing the module would increase knowledge on PIEDs through filling ('*huge*', Sexual health nurse, the Netherlands) gaps (i.e. on issues such as variety of substances used, motivations, adverse effects, legality, breadth of use, use outside of competitive sports). As shown in quote 7, it was felt that there was currently a gap information provision across professions, and that they envisaged that they would use the tool in future or benefit from the knowledge that they had gained.

Quote 7

'I'm pleased that you're making it. There's been a massive gap in people's knowledge for a long time now and I think it's going to be our next health epidemic'

(Needle exchange/harm reduction worker, UK)

As expressed in the quotes (quote 8-11) below from those from various professions, participants felt that an increase in knowledge would allow them to better identify people who use PIED among their client/patient group and to better interact and communicate with clients. Moreover, information on topics such as the adverse effects and symptoms would not only help them identify those using PIEDs, but would aid their treatment response. Whilst the effects of completing the module on actual practice cannot be assessed through the data collected (see survey results for analysis of self-reported learning outcomes), participants reflections on the applicability of the knowledge gained from participation to their day to day practice are promising.

Quote 8

'*It gives tools that help bring up the topic with patients and help treat them. I know how to recognize a user better based on symptoms and based on the substances used, I understand the users better and know the substances better, I know what kind of users there are, I know which lab tests to prescribe, I know to check the purity of the substance'*

(Licensed physician 2, Finland)

Quote 9

'I understand the whole system [such as] substance groups and side effects] better.
Bringing up the topic is now easier if I feel like there's a PIED user in my reception'

(Medical student 1, Finland)

Quote 10

'Better recognition and detection because of more consciousness and knowledge.
I think this makes me a better nurse and indirectly this is good for PIED users because I can
help them better. Apart from better professional insight, maybe that I'm better able to
recognise PIED use in my direct environment and I could start a conversation about it I'd
think that's appropriate'

(*Nurse, the Netherlands*).

Quote 11

'If one of my current patients tells me that he was really involved in lifting weights or other
sports, then I would ask more questions to know whether he had used PIEDs in the past'

(Nurse working in addictions service, The Netherlands)

Of importance is how in quote 12, a dermatologist working in Finland highlights how the module can aid more culturally component professional practice, by promoting a non-judgemental approach and reducing stigma. To better aid interaction with people who use PIEDs, some suggested that they would benefit from the module being adapted so that it provided a go to reference point during interactions (e.g. within consultants) (quote 13).

Quote 12

'Knowing more about the phenomenon helps me not to moralize patients and lessen the
stigma, makes it easier to meet the patient as an individual'

(Dermatologist, Finland).

Quote 13

' *But certainly, I liked, you know, being able to go on and…I think those kind of tools would be good if you had the ability to log on if you felt I need to double-check about growth hormone, I need to double-check about…you know, you could log on and you could look on that section, quickly go in'*

(Drug and alcohol worker 1, UK)

Participants across professions also expressed a willingness to recommend the module to others (see quote 14 and 15) and felt that a range of professionals would benefit from using the module, including nurses, those working in sports medicine specifically, dermatologists, nutritionists, physio therapists, personal trainers, fitness instructors and gym owners. However, it was generally felt that the module would require adaptation to meet the needs of these differing groups based on existing level of knowledge, working practices and knowledge requirements and a number of barriers to its effective future use were discussed (see recommendations).

Quote 14

'Overall excellent education. I would absolutely recommend every physician to study the course'

(Doctor, Finland)

Quote 15

'*All health care experts should take the course: (practical and registered) nurses, nutritional therapists, physical therapists, and also trainers and gym owners'*

(Licenced physician 1, Finland)

Compatibility

We were also interested in how compatible the module was with individual's value system (i.e. ethicality) and wider organisational goals (i.e. thus enhancing coherence and collective action within the work force). Whilst the module aims and content were generally perceived as being compatible with the goal of both health promotion and prevention (see quote 16), it was felt that harm reduction content was lacking (see quote 17 and 18) and that the module would not '*be able to prevent use but hopefully it [could] help to prevent some harm*' (Social worker/sexologist, The Netherlands). Some felt that the module was '*conservative*' in its approach to harm reduction (Sports dietician, The Netherlands) and that more information on how to diminish side effects of use, recovering from PIED-use, interpreting blood work, safe injecting advice and advice on referral in the treatment of harms was felt to be needed.

Quote 16

'We don't condemn but just try to find out where the client's at and what they are motivated to do or change. An approach that accepts use as a given and tries to inform people with facts and options to limit harm would therefore fit with our approach'

(Sexual health nurse, The Netherlands)

Quote 17

'It doesn't necessarily tell people about…I mean, that's not the purpose of it, but there's not…there wasn't…I can't remember anything on safer injecting or cycles or stacking, or anything like that'

(PIED harm reduction service, male, UK)

Quote 18

'I missed specific harm reduction advice'

(Prevention specialist, The Netherlands)

Some medics and medical students noted that their role was to treat harm and not prevent ('*As a doctor the aim is not in prevention, it's more about treating the patient*', *Medical student, Finland)*, whilst others felt that the prevention element of the module was

useful despite this being less of a focus in their profession ('*Prevention is a common goal although there isn't information about this in medical school'*, Medical student 2, Finland). As shown in quote 19, some medics also requested more harm reduction information. Moreover, some noted that they would have benefitted from more practical advice on how to engage with PIED user and how to treat harms based on real life patient case studies. They also requested information on the legal issues surrounding what action to take if a patient divulges selling controlled PIEDs (e.g. licensed physician, Finland). More information on the PIED market such as the price of substances/products and information on how to refer patients to other services and useful information was requested. Other health care workers noted specific omissions that would have been useful additions, such as information on use of image enhancing substances and procedures used more by women (e.g. cosmetic fillers). However, harm reduction content was not regarded as relevant to the participant working within the police (The Netherlands).

Quote 19

'I would hope to have more information/reasoning from the harm reduction aspects and ethical reasoning to choose the first-line treatment. For example, a patient arrives to the reception because of the harm cause by (doping substance) use, but (he/she) is not yet motivated to stop substance use'

(Doctor, Finland)

Required effort, self-efficacy and user commitment

To assess participants commitment and engagement with the module (i.e. cognitive participation), we explored whether they felt that implementing the tool was a 'good idea' and whether they were willing to invest effort, time and work into the module within their future practice. We were also interested in the work and effort involved to make the module function effectively, whether it would enhance or impede their work (i.e. burden) and whether participants felt confident that they could complete the module (i.e. self-efficacy).

Overall, participants felt that the module as 'a good idea' (i.e. '*the course was good as a whole'*, medical student 2, Finland; '*superb, well produced, clear, concise',* Drug and alcohol worker 2, UK). However, most primary and secondary care physicians and those working within wider health care, discussed the time commitment required to complete the module in its current form and felt that the amount of time needed acted as the main barrier to completion. Some had completed the module in work time (e.g. policy maker, UK, police officer, The Netherlands) but most of those from the wider health field, and all medics, had done so in their own time. They discussed putting dedicated time aside to complete the module and for many (see quote 20 and 21), this meant giving up their own time to complete the module outside of working hours. Whilst this shows a certain level of commitment and that most were prepared to invest time, effort and work into the module, for some this was still regarded as a burden and involved balancing the act of competing the module with other commitments.

Quote 20

'Time and relevance would be the biggest barriers because there are many other things we need to do and focus on and I don't think we get many clients with PIED related issues. And because work pressure is already quite high, we would have to do it at home since there is no spare time to do such things. They would have to pay such hours'

('Social worker with nursing responsibilities, The Netherlands)

Quote 21

'*I did in my own time at home but if I had done it at work, I would have had to steal time where I could. In the ER you never know but there is no way I could have done this in one go had I done it at work'*

(Nurse, the Netherlands)

As shown in quote 22 and 23, it was felt that ideally dedicated time would be provided and allocated within their working day to undertake training such as that provided by the module, yet given competing priorities, this was felt to be unlikely.

Quote 22

'*The present course requires quite some time investment. The employer has to facilitate this. If people have to do it in their spare time, I think then a lot of people will not do the course*'

(Nurse in addiction service, The Netherlands)

Quote 23

'*Allocating/finding time for the course. Could it be done on an office day or a special training day or would it have to be done on the doctor's own time. Now taking the course depends on the own interest of the doctor. Taking the time during work hours, would be good to be able to take the course during a training day organized by the employer*'

(Licenced Physician, Finland).

For those that did not complete the module, the reason provided was lack of time and the overly long length of the module. The amount of time required to complete the module was felt to be increased by its scientific nature (see quote 24 and 25), and it was generally felt that it should be shortened if it is to be accepted and effectively used and applied within professions in which staff have limited time for training and face a number of competing restrictions on their time.

Quote 24

'*[The module is] quite scientific which I don't think is necessary for a number of professionals, increasing the time it takes to complete and perhaps making it more confusing. I enjoyed it however, felt that there was a lot of interesting and useful information and would be happy having it as another information resource*'

(Doctor/Physician, Finland).

Quote 25

'I feel it was too academic and some medical terms could have been used in lay man's terms as I spent a lot of time looking up meanings in the medical dictionaries '

(Drug and alcohol worker, UK)

Despite such criticisms, many noted that they felt the module was well written and all medics felt that the course content was clear and accessible. As such they appeared to hold a high level self-efficacy and confidence that they were able to complete the module in a way that did not require too much effort. However, as discussed, those working within wider health care settings felt that at times the content was too lengthy, detailed and scientific, which effected their confidence in their own comprehension of certain medical terms. This meant that completing the module required additional effort (e.g. looking up medical terms) and time commitment, and as such they felt that it needed adapting for future use (see quote 25). As shown in quote 26, e-learning was a common and increasingly used format used across professions, yet some felt they that would also benefit from face to face training and a paper copy of the module content. All reported that they had the technical skills (i.e. IT skills, e-literacy). Combined with the common use of e-learning, this meant that no training in using such platforms was not required. Other than one individual who noted that they did not have access to the devices required to fully engage in the tool content within the work place (i.e. lack of PC speakers at work to listen to videos), all reported having the technical support (i.e. access to a computer (more so than a smart phone)) in the work place and at home to complete module.

Quote 26

'Yes…its [e-learning] quite common. Next to face to face interaction, it is the most common When it's more about practicing like for instance motivational interviewing or how to physically deal with aggressive behaviour we would have group trainings with role plays and actors. When it's more about knowledge transfer it will be e-learning'

(Social worker with nursing responsibilities, Finland)

Barriers and future implementation

Reflecting on the above, a number of barriers to the acceptance, use and effective implementation have been identified. These occur at the individual, organisational and wider societal level, and have informed the recommendations provided that describe a number of considerations and required changes to aid the future implementation of the module across a number of professions.

Individual level barriers/changes

It was suggested that a lack prior knowledge on PIEDS among health care workers meant that they are unaware of PIED use as a public health issue and as such, may not see the module as relevant to their profession. A lack of drugs knowledge in sectors such as needle exchanges was also noted as a barrier to engaging in substance specific learning and learning other than that required more generally (e.g. information on safe injecting practices) (see quote 27). Some highlighted the need to more actively promote the module and push the message of PIED use as a public health issue of relevance to a wide variety of professionals to encourage engagement with professional learning around PIEDs, including the module. Similarly, it was suggested that the module should more clearly outline the ways in which PIED use is a public health issue and the role of certain professions in addressing it (i.e. on the landing page), to encourage people to complete it.

Quote 27

'It's one of those things that people kind of generally tend to shy away from because as you know, with needle exchange, I can train anybody to in 30, 35 minutes. Kind of you know, the safe injecting stuff and what are the side effects and things like that but people don't feel comfortable with it, a lot of our workers don't have a massive drug knowledge. You know they've worked on recovery and don't know much about the compounds that people take, or whether its heroin or whether its steroids'

(Needle exchange/harm reduction worker, UK)

Changes to the tool itself

A number of changes to the tool itself were discussed as being required to enhance the tools usefulness, relevance and use in future practice. As discussed and shown in the quotes below (28 and 29), the main content issues discussed by those from those working in wider health care was the overly scientific nature of the content, which was felt not to be required in their day to day practice. As such, generally it was felt that the module would be better suited and taken up if the content was simplified ('*dumbed down', Needle Exchange worker, UK')*. This suggests that the module requires careful adaption if it is to be successfully rolled out and used by those working outside of the professions to which it was originally targeted (e.g. medics). In addition, although the content was regarded as comprehensive, it was felt to be overly long (*'long winded*', policy maker, UK) by some, who felt that it should be shortened to aid its usability and future use ('It was very comprehensive…it could be a bit shorter and concise though', Nurse, The Netherlands).

Quote 28

'The beginning is quite tough, with all the medical terms. Later in the course this was less the case. I thought: "I don't need to know all this information; I just want to be able to work with people that use or abuse those substances".

(Independent psychosocial therapist, The Netherlands).

Quote 29

'And I think unless you're really interested in the area, I think it would be easy to get bogged down, it just felt like there was a lot in there which didn't need to be quite so complicated'

(Needle exchange/harm reduction worker, UK)

The main barrier to completing the module was practical and related to the length and the amount of time required to complete it. This was by far the most common barrier to completion discussed, with almost all participants highlighting time restraints as a barrier. Most had completed the module in their own time and some felt that completing in work time would affect their ability to meet other priorities. Within a context in which PIED use may not be prioritised or seen as relevant, the issue of time was particularly pertinent. As such, it was generally felt the module content should be more concise and shorter.

Quote 30

'The present course requires quite some time investment. The employer has to facilitate this. If people have to do it in their spare time, I think then a lot of people will not do the course'

(Nurse working in addictions service, The Netherlands)

Quote 31

'I think that it would probably be best and if it was split down into say half an hour, half an hours or less…if you say 2 hour e- learning you know they'll be jumping out the window and to be split up into smaller tasks'

(Needle exchange worker, UK)

Those with a high level of PIED knowledge also highlighted that some content was incorrect and not up to date with the current evidence base, whilst others felt that the module currently lacked user voice. As such, it was suggested that amendments should be made to the content, that the module would need to be updated to keep in touch with current debates and research, that those using PIEDs should be consulted on the tools content and that short videos could be included expressing user perspectives (see quote 32). The latter point is important given that a number of participants pointed out that in parts, the module used language that may be interpreted as stigmatising. For example, in quote 33, an individual working within a needle exchange and PIED harm reacting service in the UK, discussed how suggesting aggression is a common outcome of use can lead to stigma. In quote 31, the use of the term 'doping' (quote 34) is also highlighted as stigmatising in a UK context. Such comments highlight the need for more culturally sensitive adaption of the module when being implemented in some countries. Correcting such language was also felt to be important to prevent its use being passed on to health professionals, and to prevent such language impeding the development on non-judgmental and culturally sensitive interactions between professionals and those who use PIEDS (see stigma theme). Consulting those within the PIED community on the course content and use of language would assure that the content is culturally sensitive and as such aid professional competence (*'It would be interesting to see behavioural insight from a user's point of view and what they would like to see as well, Policy maker, UK.*

Quote 32

'The video interviews did not greatly contribute to my understanding of the topic. I would rather like to see interviews with users of PIEDs. I would like to hear why somebody decides to use PIEDs, at what age, if there is a lot of peer pressure,… And then interview PIED users, or former users, at different stages of life. So young adults, but also older adults'

(Nurse in addiction service, the Netherlands)

Quote 33

'Yeah, I felt there was bits and pieces in there which I would have questioned as being accurate or perhaps a little bit stigmatising for clients' kind of reading it…there was something about saying the behaviour is often aggressive. It's not really what we're hearing or seeing when we're working with clients'

(PIED harm reduction service worker, UK)

Quote 34

'The word 'doping' is stigmatising language. It should be challenged. WADA is wrong, the media are wrong, to use the terminology'
(Drug and alcohol worker 4, UK)

As discussed, a number of specific content themes were regarded as being missing from the tool by medics and other health care workers, most notably, harm reduction messages (*' I missed specific harm reduction advice' Prevention specialist, The Netherlands)* and more practical advice on issues such as referral (see compatibility section). Moreover, a number of more practical amendments were suggested such as easier access and log in, including references in the text, providing a search function and including a function for content to be turned into PDF's and downloaded and/or printed, and the provision of PowerPoint slides containing a more concise version of key messages that could be used in training with colleagues. Some felt that whilst the format of an online module was useful for their own learning, they would benefit from the content being adapted and presented in a way that

would allow it to be used as a resource within real time interactions with clients/patients. Moreover, others suggested that more interactive components are needed to maintain interest in the content, boost learning and reduce the amount of time required to read the content in it's current ('*lengthy*' and '*dense*') form. For example, it was suggested that the module would be improved by displaying information more visually as opposed to relying on text (se quote 35 and 36) such as including more interactive components (e.g. tables, images, quizzes, more videos). This would also help distinguish the module frim more traditional text book based courses. Others suggested that short quizzes and tests between sections rather than assessment at the end of the module would be more beneficial in aiding self-assessment and learning.

Quote 35

'The visual presentation can also be improved, i.e. integrate interactive components, videos, etc. Now the options e-learning may offer are not used; now it's identical to a "paper course"'

(*Author of PIEDs publications, consultant for athletes, The Netherlands*)

Quote 36

'More practical information about encountering the patient who uses. As a visual person I liked the pics, tables and videos, they helped in taking in the information. More visual elements would help'
(Medical Student, Finland)

Organisational level barriers/change

Whilst a lack of individual awareness and engagement with PIED use as a public health was discussed as a barrier, it was also noted that such views reflected organisational culture and that in some professions senior management needed to be persuaded and made aware of the modules relevance to their client/patient population. Whilst most felt that senior management would endorse the module, some highlighted that due to competing priorities (as shown in quote 37), individuals would have to raise awareness within the organisation of its relevance and push to get the issue on the agenda. Others suggested that the module should be compulsory (see quote 38) and that accreditation was '*necessary*' (independent psychosocial therapist, The Netherlands) to encourage senior management to endorse the module and for it to become routine practice. Accreditation would lead to the module

becoming mandatory and in turn help secure the provision of allocated work time to encourage individuals to engage and reduce the burden of commenting the module in their own time.

Quote 37

'If it's not mandatory for accreditation, it doesn't have priority.   I think it's interesting, but I don't think it stands much chance. It is a very top down approach where the interests of the staff are not given too much consideration. I think if it was up to nurses and doctors, I think there would be much more enthusiasm.'

(Nurse, the Netherlands)

Quote 38

'Yeah I think so you know, and if it was made compulsory cos it doesn't happen in the services, especially the drug and alcohol recovery services, and yeah I think it would be something that they'd be interested in'

(Needle exchange worker, 2, UK)

Stigma as a wider societal barriers/consideration

Within interviews, participants discussed how despite PIED use becoming more common and perhaps normalised, stigma still exists and acts as a barrier to people who used PIEDs engaging with services and discussing use with health professionals. It was also suggested that stigmatising views may impact on professionals willingness to engage with the issue and the module and thus impact on their knowledge and competence to effectively engage with those using when needed, thus reinforcing stigma as a barrier to engagement. As shown in quote 39, it was felt that although the module aimed to improve knowledge and in turn encourage effective interaction between those using PIEDs and health professionals, those using PIEDs did not engage with health services due to the stigmatising views and prejudice that they could experience.

Quote 39

'The vast majority of people don't engage with medical health services just because of the stigma and the, like, open arrogance and prejudice that a lot of medical professionals show.'

(Self-employed harm reduction service lead, PIED user)

GPs were discussed as the first point of contact for people who use PIEDs and it was felt that it was essential that they engage with the module and enhance their knowledge, '*take their (users) demands seriously and listen in a non-condemning way'* (*Author of PIEDs publications, consultant for athletes, The Netherlands*). Whilst the issue of stigma is one that exists on a wider societal level relating to social norms around use, it is played out at both the organisational and individual level. As explained in quote 40, the module was regarded as a way in which the issue of stigma could be addressed, yet as discussed, it is important that the language within the module is carefully considered to prevent stigma being reproduced and reinforced through its content. Moreover, although the module does include some information aimed at increasing the cultural competence of health care workers to aid non-judgemental responses, this could be further developed.

Quote 40

'But that's why the knowledge on it isn't as good as it should be, because it's that stigma that's attached to it, whether we need to kind of break that stigma down and actually start opening up. So certainly, in that aspect, and obviously, again, like the needle exchanges, it could be part of an overall kind of course that's a module on it, do you know what I mean?'

(Policy maker, UK)

Summary

Interviews (N = 27) with health care workers who completed the health professional module were conducted to gain insight into its acceptability, usability and implementation. Overall, it appeared that the module provided a coherent PIED resource with a clear purpose of aiming to increase professionals' knowledge and make them better placed to identify and communicate with clients/patients who may be using PIEDs. Primary and secondary care physicians provided examples of how the module content would better aid their practice, such as decisions around suitable treatment. The module exceeded the expectations of most participants, yet physicians had more precise expectations and felt that it provided a more distinct learning resource given that they lacked prior knowledge and were unfamiliar with existing PIED resources. There was a lack of clarity over the module aims and a lack of expectations among those from other types of professional background suggests that the module requires further adaptation if it is to be rolled out and targeted towards and effectively used by those from diverse professional back grounds. As such, it was interpreted as more coherent by physicians (Finland) and appeared to be more accepted than those from other professional backgrounds, which reflects how the module was originally designed to target the medics.

Generally, the module content appeared to be compatible with existing practices, individual and organisational values among primary and secondary care physicians and other health care workers. Although participants where from varied backgrounds, they all felt that with adaptions, the module would be useful and effective in enhancing knowledge, identifying those using PIEs and informing interactions and responses to PIED use. They expressed a shared purpose of aiming to reduce the harms of PIED use, and to some extent prevent use, and as such felt the content was relevant. However, a lack of harm reduction messages was highlighted as a key barrier to the practical application of the module content to the working practices of both, thus acting as a barrier to the modules future effectiveness. A number of other amendments to the module content were suggested and the degree to which the depth of scientific information as felt to be required differed by profession. The overly scientific nature of the module content was felt to be unnecessary those other than physicians, and this led to less acceptability.

Overall, participants felt that the module was needed and as such a good idea. They were prepared to invest time, effort and work into the module, yet a number of barriers to future acceptance and effective use and implementation of the module emerged. The time burden of completing the module acted as a key barrier and as discussed, the overly

scientific nature of the module was felt to be unnecessary for the wider health care field, which worked to reinforce the time commitment needed to confidently engage with the content effectively. Others felt that the module should be more interactive. The various barriers outlined above are in need addressing to allow the module to be accepted by the user groups across professions, and for the successful implementation of the module into routine professional practice. Overall, the module requires further adaptation if it is to rolled out, targeted towards, accepted by and effectively used by those working in wider health care settings.

7.2.   Work package 4: Fitness industry professionals

7.2.1. Fitness e-module Survey results

Participants

Data were collected in three countries (FI, GR LT,) for readability, combined results are presented in the narrative, with country breakdowns in accompanying tables where relevant. In total, data from 51 participants was included in the analysis (FI = 17, 11 female; GR = 20, 5 female; LT = 14, 10 female). Twenty five described themselves as fitness instructors (individual and group), 4 as coaches, and the remaining were a mixture of students, gym owners/managers; and health promotion workers. They had worked a mean of 10.2 ± 7.6 years in their occupational field (range 1-34 years; this question wasn't included in the Greek survey); and 28 had at least an undergraduate degree (54.9%), with the rest reporting high school qualifications or equivalent.

Seven participants (13.7%) had previously worked with people who use PIEDs, and 7 (13.7%) did so currently, although 17 (33.3%) suspected that some of their clients used these substances, but this had not been confirmed. Eighteen (36.7%) reported that none of their clients used PIEDs.

In respondents who knew of, or suspected PIED use, they estimated they had worked with approximately 3.9 ± 5.2 (median 2; range 1-20) people who used PIEDs in the previous 12 months, and around 9% of these were estimated to be injectors (range 0-100%). Backgrounds of people using PIEDs that respondents had come into contact with the past included amateur athletes (mentioned by n = 38 respondents); professional/elite athletes (n = 13); non-competitive bodybuilders (n = 13); fitness enthusiasts (n = 12); and competitive bodybuilders (n = 11); Twenty three (45.1%) participants had observed an increase in the

number of adults using PIEDs, whilst 10 (19.6%) reported this for clients aged under 18s as well. Where identified (n = 35), 15 participants reported that PIED use was identified through client self-disclosure, and thirteen through observing physical signs, including greater than expected training progress or side effects such as acne. Thirty participants (76.5%) reported that they would encourage clients to cease PIED use if this had been identified; 5 would not (9.8%), with the remaining answers given (n = 5; 9.8%) stating that they had not met people who use PIEDs before and so would not know what to advise.

When asked to reflect on the reasons why they thought they people used PIEDs. In descending order of frequency of reporting (participants could endorse several categories) these were: developing body image/aesthetics (n = 35; mentioned by 68.6% of respondents); to aid non-competitive bodybuilding (n = 16; 31.4%); to improve self-esteem (n = 15; 29.4%); because of body image disorders (n = 9; 17.6%); because of social-norms around masculinity and femininity (n = 13; 25.5%); muscle growth and strength (n = 19; 37.3%); weight and fat loss (n = 21; 41.2%); to improve sexual attractiveness (n = 12; 23.5%); competitive bodybuilding (n = 14; 27.5%); for hormone replacement therapy (n = 4; 7.8%); and to support occupational performance (n = 5; 9.8%).

A majority of respondents (n = 31; 60.8%) thought that use of PIEDs should be an offence. Only six people (11.8%) thought the predominant response to PIED use should be criminal justice led though, with most thinking anti-doping (n = 22; 43.1%) or public health approaches (n = 16; 41.4%) were preferable. Respondents were asked to rate the acceptability of PIED use by particular groups (rated 0 = very acceptable to 10 = not acceptable at all).

There were no notable differences between reference groups, but highest mean scores, indicating lowest acceptability, were provided for males (7.3 ± 3.3), fitness enthusiasts (7.2 ± 3.1), professional/elite athletes (7.1 ± 3.3), females (7.1 ± 3.1), competitive body builders (7.1 ± 3.6); recreational athletes (7.1 ± 3.4); non-competitive body builders (7.0 ± 3.6), and amateur athletes (7.0 ± 3.2). For reference, acceptability in adults in general was rated as 7.3 ± 3.1. Overall, cited examples were country specific (e.g. Dopinglinkki (FI); Galinos (GR); Bedopingo (LT)), but also included the WADA website, and YouTube training videos. Sources of information and training included information identified after internet searches (including specialist, and non-specialist sites such google scholar, PubMed, and Wikipedia), specialist books, scientific research articles, and discussions with fellow professionals. Training took the form of conferences, lectures and seminars, and well as taught components of (non-specialist) University Modules.

Participants were asked to report all those PIEDs that they were aware of, or thought were used by their clients. Data is presented in Table 11 below.

	Aware of PIED (%)	Believed to be used by clients (%)	Neither (%)
Oral steroids (e.g. Methandrostenolone (Dianabol), Oxandrolone (Anavar), Oxymetholone (Anapolan 50))	36 (78.3)	10 (19.6)	5 (2.1)
Estrogen control and post cycle (e.g. Nolvadex (Tamoxifen citrate), Clomid (Clomiphene citrate))	29 (56.9)	6 (11.7)	16 (31.4)
Fat loss and other drugs (e.g. Ephedrine, Dinitrophenol (DNP), Liothyronine (T3))	27 (52.9)	16 (31.4)	8 (15.7)
Injectable Steroids (e.g. Testosterone Enanthate, Equipoise (Boldenone), Deca-Durabolin (Nandrolone))	32 (62.7)	10 (19.6)	9 (17.6)
Peptides and other hormones (e.g. Human Growth Hormone, IGF (Insulin-like growth factor 1))	24 (47.0)	6 (11.8)	21 (41.2)

Table 11 *Awareness of different categories of PIEDs*

Data on interventions respondents used in their current role, or would like to use in future are presented in Table 12 below. Six participants (9.7%) also provided blood tests and feedback. Nineteen participants (41.3% of participants providing an answer to this question N = 46) believed that there were barriers to engagement activities with those using PIEDs, and the reasons given for this included negative societal attitudes/stigma; co-location of PIED clinics with those using other drugs; clients perceiving a lack of specialist support available; an poor access to clinics (e.g. outside of working hours as those using PIEDs would typically be employed).

Intervention	Use in current role (%)	Would like to learn more and use in future (%)	Neither (%)
General health promotion (e.g. nutrition, physical exercise, sleep)	44 (8.6)	5 (9.8)	2 (3.9)
Education / Information to increase knowledge on use and harms	25 (49.0)	16 (31.4)	10 (19.6)
Expert visiting gyms to provide health advice/workshops/discuss PIED use	7 (13.7)	28 (54.9)	16 (31.4)
Development of skills to help users reduce use, harms, and to promote healthier alternatives to PIED use	15 (29.4)	26 (51.0)	10 (19.6)
Activities aimed at changing social norms and peer expectations on PIED use	13 (25.5)	24 (47.1)	14 (27.5)
Information aimed at developing positive morals and values (e.g. fair play)	24 (47.1)	13 (25.5)	14 (27.5)
Needle and syringe exchange delivery	1 (2.0)	12 (23.5)	38 (74.5)
Signposting to external needle and syringe exchange services	1 (2.0)	12 (23.5)	38 (74.5)
Drug testing of clients	6 (11.8)	29 (56.9)	16 (31.4)
Drug checking service (i.e. analysis of chemical composition of PIED)	8 (15.7)	23 (45.1)	20 (39.2)

Table 12 *Current intervention practice*

Considering their own role in supporting clients around different health topics, participants were asked to rate how much they believed that their clients trusted their knowledge and the advice that they provided (scored from 1 to 10, where 10 was knowledge and advice were judged to be 'extremely good').

Mean score for PIEDs was 7.2 ± 2.4. For other topics scores were, alcohol 6.2 ± 2.4; illicit drugs 5.9 ± 2.7; fitness in general 8.4 ± 1.7; weightlifting and body building 7.9 ± 2.3; and health and disease in general 7.2 ± 1.8. With respect to how much respondents thought that

people who use PIEDs trusted different sources of information of PIEDs (scored from 1 to 10, where 10 was 'very good').

Using the fitness professional module

Forty one (80.4%) participants reported that they had completed the module, whilst 7 (13.4%) began it, but didn't finish due to not having enough time. Three people (5.9%) reported that they did not use the module at all. Twenty six (51.0 %) completed it in their free time, whilst nine (17.6%) completed it in worktime and six (11.8%) used both their free and work time to test it. Time spent using the module ranged from 10 minutes to 6 hours. One participant (2.0%) reported that they thought it took *too long* to complete the module. A majority, 48 (94.1%) participants, believed that they had sufficient background knowledge to complete the module.

Answers to module utilisation questions are summarised in Table 13 below. Individual items were rated from 1 (totally disagree) to 5 (totally agree). Overall, there was agreement across all four domains that the module was easy to access and use; it would improve performance; was easy to understand the content, was enjoyable and interesting to use, and would be supported by the organisation. There were no notable differences between countries, although participants in Greece reported that they thought the module contained too much information, and subsequently the module was too long.

	Mean ± SD	FI Mean ± SD	GR Mean ± SD	LT Mean ± SD	Difference between countries? (p value)[1]	Post hoc differences[2]
Performance expectancy						
The tool would be useful to me in performing my job	4.0 ± 1.2	3.8 ± 1.5	3.9 ± 1.2	4.4 ± 0.6	0.227	-
Using the tool would enable me to meet my training needs more quickly	3.6 ± 1.2	2.8 ± 1.6	4.0 ± 0.7	3.9 ± 0.8	0.006**	FI v GR; FI v LT
Using the tool will increase my ability to respond to client needs	3.8 ± 1.1	3.6 ± 1.1	3.7 ± 1.1	4.3 ± 0.9	0.160	-
Using the tool, I will increase my chances of demonstrating professional competence on PIEDs	4.2 ± 0.9	4.3 ± 1.0	3.9 ± 0.9	4.5 ± 0.7	0.128	-
Effort expectancy						
The information in the tool was clear and easy to understand	4.5 ± 0.9	4.5 ± 1.0	4.4 ± 0.8	4.5 ± 0.9	0.945	-
Overall, I found the tool easy to use	4.5 ± 0.8	4.7 ± 0.8	4.3 ± 0.9	4.4 ± 0.9	0.382	-
I found the tool enjoyable to use	4.2 ± 1.0	4.4 ± 0.9	4.1 ± 1.0	4.1 ± 1.1	0.667	-
I found the tool interesting to use	4.4 ± 0.8	4.5 ± 0.7	4.1 ± 1.0	4.6 ± 0.8	0.186	-
Social influence						
People who influence my professional behaviour would think that I should use resources like the tool	3.5 ± 1.1	3.1 ± 1.3	3.5 ± 0.9	3.8 ± 1.1	0.225	-
The senior management of my organisation would support my use of the tool for my training and practice needs	3.8 ± 1.2	3.8 ± 1.4	3.2 ± 1.1	4.5 ± 0.7	0.006**	GR v LT
In general, my organisation would support use of the tool	3.6 ± 1.2	4.1 ± 1.2	3.3 ± 1.2	-	0.066	-

Facilitating conditions						
I have the technological resources necessary to use the tool	4.2 ± 1.0	4.9 ± 0.3	3.7 ± 1.2	4.2 ± 0.9	0.001**	FI v GR
I have the technological knowledge necessary to use the tool	4.3 ± 0.9	4.8 ± 0.4	3.8 ± 0.9	4.3 ± 0.8	0.001**	FI v GR
The tool is not compatible with other training and practice development approaches I use	2.9 ± 1.6	1.5 ± 1.4	3.0 ± 1.5	4.1 ± 0.9	0.000***	FI v GR; FI v LT
Behavioural intention						
I intend to use the tool in the next 12 months	3.4 ± 1.3	3.1 ± 2.0	3.2 ± 1.0	4.1 ± 0.8	0.090	-
I predict I would actually use the tool in the next 12 months	3.6 ± 1.2	3.6 ± 1.8	3.3 ± 0.9	4.1 ± 0.8	0.145	-
Additional questions						
I would recommend the tool to a colleague	4.2 ± 1.0	4.3 ± 1.3	4.0 ± 0.8	4.4 ± 0.8	0.540	-
I think the information included in the tool is credible	4.4 ± 1.0	4.4 ± 1.2	4.3 ± 0.8	4.4 ± 0.8	0.912	-
I think the case studies included in the tool were believable	4.3 ± 0.8	4.4 ± 1.2	4.3 ± 0.8	4.4 ± 0.8	0.514	-
The case studies included in the tool were similar to people I might encounter in my work	3.7 ± 1.1	3.7 ± 1.2	3.9 ± 1.0	3.6 ± 1.3	0.695	-
I think the expert videos included in the tool were believable	4.1 ± 0.9	4.5 ± 0.8	4.1 ± 0.8	3.9 ± 1.1	0.256	-
I think the expert videos included in the tool were useful	4.3 ± 0.9	4.6 ± 0.7	4.1 ± 1.0	4.1 ± 1.0	0.227	-
I think the information included in the tool is useful	4.5 ± 0.8	4.5 ± 1.0	4.5 ± 0.6	4.4 ± 0.8	0.862	-
I think the information included in the tool is too long	2.8 ± 1.4	2.1 ± 1.7	3.3 ± 1.2	2.5 ± 1.3	0.081	-

I think the tool provides too much information	2.6 ± 1.4	1.7 ± 1.8	3.4 ± 1.1	2.1 ± 1.1	0.003**	FI v GR; GR v LT
Using the tool will enhance current approaches to PIED use within my profession	3.7 ± 1.3	3.4 ± 1.7	3.9 ± 1.0	3.9 ± 1.1	0.470	-
I would be prepared to invest time, energy and work in using the tool in future	3.9 ± 1.1	3.8 ± 1.4	3.8 ± 1.0	4.0 ± 0.7	0.867	-

[1] * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; [2] Bonferroni post hoc to correct for multiple comparisons

Table 13 *Experiences of using the Module.*

Participants were asked to reflect on the intended learning outcomes of the module, and how they thought it would help other people in similar professional roles. These findings are summarised in the Table below (Table 14). It was believed that the module would be useful across all outcomes, with very few people believing that the module held very little value for the specified outcomes. For individual countries, the distribution generally followed the same pattern, although data were missing from Finland for the question on understanding the motivations of PIED use.

Learning outcomes	Percentage endorsing response				Percentage endorsing quite a bit or very much in each country		
	Very little	Some what	Quite a bit	Very much	FI	GR	LT
List a range of effects and adverse effects of the most common PIEDs	0	25.6	23.3	51.2	66.7	50.0	87.5
Define fitness doping and differentiate it from doping use in competitive sports	4.1	12.2	22.4	61.1	80.0	80.0	92.3
Understand motivation of PIED use	0	14.7	14.7	70.6	80.0	80.0	92.3
Assess the risks of PIED use	0	7.1	33.3	59.5	86.7	95.0	100.0
Identify some of the myths regarding fitness doping	0	15.9	31.8	52.3	86.7	80.0	88.9

Table 14 *Self-reported learning outcomes*

7.2.2. Fitness module interview findings

A total of 24 interviews were conducted with individuals who had completed the fitness industry module. Like the health professional module, the module had been developed by Dopinglinkki, and was targeted towards those working in the fitness industry (e.g. coaches, instructors). It was made available for use and assessment in partner countries, and translated into the participating countries language (Greek, Lithuanian). Some text was amended to fit the cultural context of each country (e.g. overview of the legality of use, prevalence of use), but generally the content remained in its original form. The professional background of the individuals taking part was similar across countries.

In Finland (N = 4) participants included coaches (n = 2), trainer (n = 1) and a (n = 1) health promoter. Two regarded themselves as entrepreneurs and one was training to be a pharmacist. One participant reported having previously received training on 'anti-doping' but most had not undertaken any other relevant training. All reported the Dopinglinkki website/tool as their main resource on PIEDs, but none had prior experience of working with people who use PIEDs. There were ten participants in Greece, and these included coaches/personal trainers (n = 5), individuals who worked in gyms (n = 4) and a gym owner (n = 1). One trainer also reported being a dietician, and another a physiotherapy. Most were aware of, or suspected the use of PIEDs among their clients, but only one had prior experience of openly discussing use. In Lithuania (N = 10) participants included personal trainers (n = 4) and a physiotherapist (n = 1). None reported receiving any prior training on PIEDs and other than the LTU NADO platform, most reported no prior knowledge or self-directed learning. All were aware of PIED use among their clients/patients.

Module coherence, effectiveness and compatibility

Describing the module

There was coherence on how participants from the different countries described the module, with all finding the module easy to describe. As shown in the quotes below, it was regarded as a '*basic*' course that used '*simple and understandable language'* and provided '*clear'* content that was '*easy to understand'* (Lithuania, trainer 2). Participants regarded the module as providing a useful resource on all aspects of PIED use and as shown in quote 2 and 3, although it was targeted at those working with (adult) amateur athletes, it was felt to be also

applicable those working with other populations (e.g. young people , general population). It was described as having a clear purpose and there was consensus that it would increase their knowledge, help them identify those using, allow them to pass on information to those using and enhance their professional competences when interacting with clients who use PIEDs (*I will feel more comfortable to discuss about PIED harm with my clients' (Trainer 2, Lithuania).* Such coherence and clarity suggest the module was accepted and understood by all participants.

Quote 41

'It is an extensive basic course, anyone taking the course can easily do it, no prior knowledge about the topic is needed but at the same time it's useful also for someone in the know'

(Coach 1, Finland)

Quote 42

'It is a distance education program for trainers who work with amateurs, but they will be able to apply this knowledge when working with children ... The information has been presented in a clear and detailed manner for people who do not have special medical education'

(Trainer 1, Lithuania)

Quote 43

'It is a distance education program for trainers who work with ordinary people, not in the professional world. The information is presented in a simple and understandable language'

(Personal trainer/coach 1, Lithuania)

Quote 44

'Basic information on the use of substances and how can we learn more about the substances. I found it quite interesting'

(Personal trainer/coach 1, Greece)

Expectations

There was also coherence in how participants described their expectations of the module. Most had expected the module to provide an overview of the '*the basics'* of PIED use and reported that this expectation was met (quote 45). However, some with prior PIED knowledge had hoped for more '*detailed*' content and a more '*extensive course'* (Finland, coaches and trainers). For example, a more detailed overview of the prevalence of use (I.e. it is important to note not such data is not available in some countries), more information on food and nutritional supplements and their interactions, more information specifically outlining how to '*recognize a user'* (Finland, Wellness coach) and information on long-term effects (Finland). Some had been sceptical about the value and orientation of the tool prior to taking part, and as shown in quote 46, had expected the tone to be more judgemental. They reported that they were therefore pleased that it provided a more balanced overview of PIED use. For some it provided new knowledge, and for others, it provided reassurance of their existing knowledge ('i*t renewed my existed knowledge on supplements, because in my bachelor studies I had done my thesis on supplementation'*, *Personal trainer/coach 2* Greece).

Quote 45

'Yes it did [meet my expectations]. Not a whole lot more could be done…It's a good whole… exam was good. Everyone who uses the tool could find it useful. No prior knowledge is needed, but it's still not useless for someone more knowledgeable'

(Trainer 1, Finland)

Quote 46

'At first I was sceptical because I thought it would be an ordinary explanation that doping was bad, and here everything was argued so that you could make the right decision'

(Physiotherapist, Lithuania)

Distinctiveness

In the main, participants across countries had little prior training and self-directed learning on PIED use. Previous examples of resources consulted included the Dopinglinkki website/tool (Finland), the LTU NADO platform and the media (Lithuania, see quote 47). In Lithuania the module was discussed as the first resource available in the Lithuanian language. As such, the module provided a new, distinct from existing sources and '*pioneering*' (*Personal trainer/coach 2,* Greece) resource for some, and they were keen to participate as part of their self-directed learning. For those who did have prior experience of use of PIED resources, it was regarded as similar in content, yet it was still felt to be unique in that it was online, interactive, and free to access. Overall, it was felt to be a credible resource (with the expert videos adding to the feel of credibility), that would complement others. It would form '*the basis'* (trainee pharmacist and health promotor, Finland) of self-learning, but other resources would be consulted to gain a deeper understanding (quote 49).

Quote 47

'*Until this program I wasn't looking for and interested in PIED, just as I knew from the media what was forbidden and so on'*

(*Physiotherapist, Lithuania*)

Quote 48

'Haven't seen anything like it, it was like a good seminar which was to the point'

(*Gym instructor 2, Greece*)

Quote 49

'No [it would] not replace but strengthen the information that already exists, in order to have complete knowledge on this matter we must go deeper and search in more bibliographies and have further information'

(*Gym owner 1, Greece*)

Perceived effectiveness and compatibility

As exemplified in quote 50, there was consensus across professions that the main effect and advantage of completing the module was increasing knowledge. A number of gaps in existing knowledge were discussed as being addressed by completing the module, including information on the range of substances used, effects, harms, motives for use, identifying people who use and prevalence of use. As a result, some reported feeling more confident when interacting with clients and that they were now motivated to learn more about the PIEDs (Quote 51).

Quote 50

'Useful basics about PIEDs for everyone working in the fitness sector. It's a phenomenon that you need to be aware of when working in the sector, and you need to be able to know the basics of when you meet a user. [it] Increased my own knowledge about the topic'

(Finland, health promotor)

Quote 51

'Using this program will give you more confidence in dealing with your customers, what I can say, it has really inspired me to learn more about food supplements'

(Trainer 4, Lithuania)

Others valued the module in helping them identify clients who used PIEDs and that they were now able to pass on '*reliable information'* (psychotherapist, Finland) to clients to assist them in making more '*informed decisions'* regarding use (quote 52). The module was discussed as being useful for the purposes of both prevention and harm reduction (quote 53) and was regarded as being beneficial to other professionals such as dieticians, psychologists, teachers, nurses, doctors, pharmacists and physiotherapists.

Quote 52

'[The] first the gain is to me as an athlete because I work out as well, then that you can transfer your knowledge to the clients so he/she can make an informed decision'

(Gym owner 2, Greece)

Quote 53

It can be used by trainers for prevention and to inform the users about the harm'

(Personal trainer/coach 1, Greece)

Most reported that they felt that the module was appropriate for their profession and that they had a responsibility to inform and communicate with clients about PIED use and related harm. For example, it was suggested that as there was a general lack of knowledge on PIEDs and that some professionals may actually encourage use, those working in the industry who held a trusted positon were ideally placed to '*affect his/her perception and thoughts'* on PIED use (Gym owner 3, Greece). As discussed, the module was discussed as being useful to those aiming to prevent use (quote 54 and 55), as well as those aiming to enhance health and increase harm, yet some were unsure and suggested that it was not their role to interfere in the decision making and '*private business'* of their clients (Trainer 4, Lithuania).

Quote 54

'It will make them think twice before using'

(Gym owner 2, Greece)

Quote 55

'A very good idea, with such ideas in the future we will have better information on this matter and better prevention'

(Gym instructor 3, Greece)

Moreover, and as shown in quote 56, some participants were unsure as to whether applying the knowledge gained from the tool to discussions with clients, would actually prevent use. It was also suggested that the module content may be more effective as a primary prevention tool when applied to interactions with target groups who had yet to initiate use of PIEDs, rather than those who had already begun to use (psychotherapist, Lithuania). Overall, however, the module appeared to fit with participants' value systems and wider organisational goals, and there was coherence in the way in which participants described its practical use within the existing practices and value of the fitness industry. Whilst most felt that the module would be accepted and promoted by their employers (e.g. gyms), some noted that as they thought that PIED use was actually promoted within some gyms and by some in the fitness industry professionals, it would not be taken up and promoted.

Quote 56

'My clients do not see any trouble with the use of PIED, and whether their approach will change when I present this program to them, we'll be able to discuss later'

(Trainer 1, Lithuania)

Required effort, user commitment and self-efficacy

Overall, participants did feel that the module was 'valuable' and '*a good idea'* (i.e. '*a very good* idea', (Personal trainer/coach 1, Greece). A small number found it difficult to find the time to complete it, but all had done so, suggesting a high degree of user commitment to using the module. As exemplified in quote 57, other than having to time aside to complete the module, most did feel that completing the module had involved minimal effort. All reported that they had the technical skills (IT skills, e-literacy) required to complete the module and that e-learning was a common way of learning within their profession. This meant that additional training in using such platforms was not required. Whilst most had access to computers at work, some suggested smart phone access was more applicable to their roles (e.g. '*my suggestion would be to have access on the tool by a mobile phone'*, (Personal trainer/coach 2, Greece). As discussed, overall the content was regarded as clear and easy to understand, and only one reported feeling that the content was difficult to understand in parts. This suggested a high degree of self-efficacy among participants.

Quote 57

'Minimal effort [was involved]. I had to do it in my own time. A very easy to use the system'

(Coach, Finland)

Barriers and future implementation

Many participants believed that there were no barriers to the future acceptance and use of the module within their profession (see quote 58). They reported their intention to use the module in the future and most felt that it could become routine practice in their profession. Those that were unsure as to whether the module would become routine practice questioned their own role in intervening and preventing PIED use among their clients (Lithuania). When barriers to future use were reported, they were at the individual level and organisational level. This included a lack of awareness among individuals that the module was relevant to their work (quote 59) and a lack of time to complete the module (as discussed above). It was also noted that for the tool to be effectively used, it would require willingness and effort to encourage and endorse the module at the organisational level. However, the degree to which gym instructors and owners would endorse the module was also discussed as being variable. It was therefore suggested that the usefulness of the module should be highlighted to individuals and employees, that the module should be better advertised, and that ideally dedicated time in working hours would be provided by employees for staff to complete the module. As discussed, some requested additional content (e.g. on food and nutritional supplements), an app or mobile accessible version of the module, and some felt that the log in process should be simplified.

Quote 58

'I don't think that there are any barriers because the tool is so easy to use, it's very low threshold, doesn't get any easier than this'

(Coach, Finland)

Quote 59

'People who think that this doesn't concern them don't take in new information in a pre-emptive way only fixing things reactively, the course should be advertised to them more'

(Finland)

Quote 60

Trainers don't have the right knowledge and think that you don't have to know much on this topic so it is the perception and mind-set that must change'
(Personal trainer/coach 1, Greece)

Summary

Interviews (N = 34) were conducted with individuals who completed the fitness industry module to gain insight into its acceptability, usability and implementation. Overall, it appeared that the module was accepted and understood by all participants. It provided a coherent PIED resource with a clear purpose. It was regarded as a creditable, basic, clear and easy to use resource on all aspects of PIED use, that for most, was distinct from other resources and unique in that it was online, more interactive, in their native language and free to access. There was consensus that completing the module had and would increase knowledge, help identify those using PIEDs, provide information that could be passed onto clients who used PIEDS, and that it increased professional competence and confidence when interacting with clients who use PIEDs. It provided new knowledge and filled gaps in knowledge for some, and for others, it provided reassurance of their existing knowledge.

Generally, the module content appeared to be compatible with existing practices and individual and organisational values of both preventing use and reduce harm. Most felt that it was appropriate for their profession and that they had a responsibility to inform and communicate with clients about PIED use and harm. However, some did not feel that it would meet these goals in reality and a small number did not feel that it was their place to intervene in clients use.

There was a high degree of user commitment to using the module, and all had put time a side to compete it. Generally, participants felt that the module was needed, that is was a good idea and they were prepared to invest time, effort and work into it. They had the technical skills (i.e. IT skills, e-literacy) required to complete the module and apart from one participant who felt the content was difficult to understand, all were confident that they had the skills to complete it effectively. However, a smart phone version of the module was suggested as a more useful and practical format for utilisation in their day to day work. Few disused barriers to future use, but those that mentioned included a lack of time and dedicated work time, unawareness that the module was relevant to their work, a lack of willingness by employees to endorse the module, and technical issues is accessing the module.

Overall, it appears that the module requires little adaptation for it to be accepted by and effectively used by those working in the fitness industry. Approaches to gaining organisational support are however needed.

7.2.3. *Safe You App Survey Results*

Participants

A total of 19 participants from Greece (n = 12 male) completed the Safe You app survey, but one participant only partially completed it. 7 described themselves as Coaches; 6 as Personal Trainers; 3 as Group Fitness Instructors; and 2 as Gym Owners. They had worked a mean of 7.26 ± 3.1 years in the fitness industry (range 1-12 years); and all had University degrees (11 Masters Level Degree; 8 Undergraduate). None had previously received specialist qualifications related to PIED use, although two reported previously attending specialist seminars.

Only four participants (21.1%) had previously worked with people who use PIEDs, although eight (42.1) suspected that some of their clients were using these substances, but this had not been confirmed. In these respondents, they estimated they had each worked with approximately 3 people who used PIEDs in the previous 12 months (range 2-10), and an average of 2 of these were also recreational athletes (range 2-10). Other backgrounds included fitness enthusiasts (total n = 2 clients); amateur athletes (n = 7); professional/elite athletes (n = 5); competitive bodybuilders (n = 6); and non-competitive bodybuilders (n = 6); There was the perception that injection of PIEDs took place, but there was a wide range of

estimated numbers reported, ranging from 30% to 100% of clients encountered. Eight (42.1%) participants had observed an increase in the number of adults using PIEDs, whilst four (21.1%) reported this for clients aged under 18s as well. Where specified, participants reported that people who use PIEDs were usually identified through changes in appearance (n = 8; including rapid muscle growth or changes in training practices) or through self-identification (n = 5). Sixteen participants (84.2%) reported that they would encourage clients to cease PIED use if this had been identified.

Thinking of their client group more generally, participants were asked to report why they thought they might decide to use PIEDs. In descending order of frequency of reporting (participants could endorse several categories) these were: developing body image/aesthetics (n = 11; 17.5%); weight loss (n = 10; 15.9%); to improve self-esteem (n=8; 12.7%); because of social-norms around masculinity (n = 7; 11.1%); muscle growth and strength (n = 6; 10.0); because of body image disorders (n = 5; 8.0%); non-competitive bodybuilding (n = 5; 8.0%); to improve sexual attractiveness (n = 4; 6.3%); competitive bodybuilding (n = 4; 6.3%); to support occupational performance (n = 2; 3.2%); and for hormone replacement therapy (n=1; 1.6%).

A majority of respondents (n = 14; 77.8%) thought that use of PIEDs in sport should be an offence; whilst 11 (57.9%) thought possession should also be prohibited. Accordingly, only 3 people (15.8%) thought that PIEDs should be allowed to be prescribed for non-medical purposes. However, only a minority (n = 4; 21.1%) thought the predominant response to PIED use should be criminal justice led, with an equal number believing that an anti-doping or public health approach was preferable (n = 7; 36.8% for each). Respondents were asked to rate the acceptability of PIED use by particular groups (rated 0 = very acceptable to 10 = not acceptable at all). The highest mean scores, indicating lowest acceptability, were provided for amateur athletes (6.2 ± 4.1), young people (6.0 ± 4.6), and females (5.7 ± 4.0); followed by recreational athletes (5.6 ± 4.1) and professional/elite athletes (5.6 ± 3.5), fitness enthusiasts (5.4 ± 4.1), non-competitive body builders (5.3 ± 4.0), males (5.2 ± 3.9), and competitive body builders (5.0 ± 3.8). For reference, acceptability of use for adults in general was rated as 4.9 ± 3.8.

Thirteen participants reported that they required information or training on PIED use prior to completing the app; but only 7 (36.8%) had actively sought out information, and 9 (47.4%) had received training on use and associated harms. Only 8 (42.1%) had previously used an app, website or other e-learning tool to improve their knowledge on PIEDs. Sources of information included internet searches, research articles, discussions with fellow professionals and gym users. Training took the form of lectures and seminars, and well as

taught components of (non-specialist) University Modules. Of the 6 participants who felt that they did not require further support, only 1 (16.7%) had previously sought out information, and 2 (33.3%) had received training).

With respect to sources that client groups might utilise to obtain information about PIEDs, body building websites and online forums were most frequently cited (n = 19); followed by coaches and personal trainers (n = 14); and those who sold them the PIED (n = 11). Fewer respondents thought that those using PIEDs would seek advice from formal support services (n=10) or doctors and other health professionals (n = 2). Accordingly, fiends at the gym, gym owners/managers, coaches, online forums, and people who sold PIEDs were ranked as being more trustworthy to provide accurate information on PIEDs than formal support services.

Participants were asked to report all those PIEDs that they were aware of, or thought were used by their clients. Data is presented in Table 15 below.

	Aware of PIED (%)	Believed to be used by clients (%)	Neither (%)
Oral steroids (e.g. Methandrostenolone (Dianabol), Oxandrolone (Anavar), Oxymetholone (Anapolan 50))	14 (73.7%)	4 (21.1)	1 (5.3)
Estrogen control and post cycle (e.g. Nolvadex (Tamoxifen citrate), Clomid (Clomiphene citrate))	10 (52.6%)	3 (15.8)	6 (31.6)
Fat loss and other drugs (e.g. Ephedrine, Dinitrophenol (DNP), Liothyronine (T3))	10 (52.6%)	1 (5.3)	8 (42.1)
Injectable Steroids (e.g. Testosterone Enanthate, Equipoise (Boldenone), Deca-Durabolin (Nandrolone)	12 (63.2%)	7 (36.8)	0
Peptides and other hormones (e.g. Human Growth Hormone, IGF (Insulin-like growth factor 1)	12 (63.2%)	5 (26.3)	2 (10.5)

Table 15 *Awareness of different categories of PIEDs*

Data on interventions respondents used in their current role or would like to use in future are presented in Table 16 below (one participant skipped this question, hence total n = 18). Thirteen participants (68.4%) believed that there were barriers to engagement activities with people who use PIEDs, and the reason predominately given for this was negative societal attitudes/stigma.

Intervention	Use in current role (%)	Would like to use in future (%)
General health promotion (e.g. nutrition, physical exercise, sleep)	14 (77.8)	4 (22.2)
Education/information to increase knowledge on use and harms	6 (33.3)	12 (66.7)
Development of skills in users to reduce use, harms, and to promote healthier alternatives to PIED use	5 (27.8)	13 (72.2)
Activities aimed at changing social norms and peer expectations on PIED use	3 (18.8)	13 (81.3)
Techniques (e.g. motivational interviewing; brief interventions) to help clients self-regulate their behaviour (e.g. goal setting, self-monitoring)	2 (11.1)	16 (88.9)
Information aimed at developing positive morals and values (e.g. fair play)	12 (66.7)	6 (33.3)
Drug testing of clients	5 (29.4)	12 (70.6)
Drug checking service (i.e. analysis of chemical composition of PIED)	3 (18.8)	13 (81.3)

Table 16 *Current intervention practice*

Considering their own role in supporting clients around different health areas, participants were asked to rate how much they believed that their clients trusted their knowledge and the advice they provided (scored from 1 to 10, where 10 was knowledge and advice were judged 'extremely good). Mean score for PIEDs was 6.3 ± 2.1. For other topics scores were, alcohol 5.8 ± 2.3; illicit drugs 5.6 ± 2.3; fitness in general 7.7 ± 2.1; weightlifting and body building 6.9 ± 2.4; and health and disease in general 6.7 ± 2.4. Overall, on a scale from 0 (not confident) to 10 (very confident), respondents reported a mean score of 3.89 ± 2.4 (range 0-8) with respect to confidence in responding to the needs of people who use PIEDs in their professional roles. Confidence scores were comparable between those who reported that they required information or training on PIED (4.0 ± 1.82) and those who did not (3.67 ± 3.67).

Using the Safer You App

Sixteen (84.2%) participants reported that they had completed the app, whilst the remaining 3 (15.8%) began it, but didn't finish. Seventeen completed it in their free time, whilst 2 (10.5%) used both their free and work time to test it. Time spent using the app ranged from 10 minutes to one week (presumably over several sessions), with 10 participants (52.6%) spending between 10-30 minutes. No participants reported that they thought it took *too long* to complete the app.

Answers to app utilisation questions are summarised in Table 17. Individual items were rated from 1 (totally disagree) to 5 (totally agree). Overall, there was agreement across all four domains that the app was easy to access and use; it would improve performance; was easy to understand the content, and was enjoyable and interesting to use. There was slight agreement that participants would be likely to use the app again over the next 12 months. However, inspection of means scores for senior management support suggested that some resistance to use was anticipated, which may account for the majority of participants testing the app in their free time. Only two participants thought that they did not have the right level of background knowledge from using the app, and both of these had not previously sought information or training on PIEDs.

	Mean ± SD	Range
Performance expectancy		
The App would be useful to me in performing my job	3.2 ± 1.0	1-5
Using the App would enable me to meet my training needs more quickly	3.4 ± 1.2	1-5
Using the App will increase my ability to respond to client needs	3.4 ± 1.1	1-5
Using the App, I will increase my chances of demonstrating professional competence on PIEDs	3.3 ± 1.1	1-5
Effort expectancy		
The information in the App was clear and easy to understand	4.2 ± 0.9	2-5
Overall, I found the App easy to use	4.1 ± 0.8	2-5
I found the App enjoyable to use	4.0 ± 0.7	3-5
I found the App interesting to use	4.1 ± 0.7	3-5
Social influence		
People who influence my professional behaviour would think that I should use resources like the App	3.4 ± 1.0	2-5
The senior management of my organisation would support my use of the App for my training and practice needs	2.9 ± 1.2	1-5
In general, my organisation would support use of the App	3.1 ± 1.1	1-5
Facilitating conditions		
I have the technological resources necessary to use the App	3.7 ± 1.3	1-5
I found the App easy to use on a smartphone/iPhone or tablet/iPad	3.6 ± 1.4	4-5
I found the App easy to use from a PC	4.6 ± 0.5	4-5
I have the knowledge necessary to use the App	3.9 ± 1.2	2-5
The App is not compatible with other training and practice development approaches I use	2.3 ± 0.9	1-4
Behavioural intention		
I intend to use the App in the next 12 months	3.2 ± 1.1	1-5
I predict I would actually use the App in the next 12 month	3.0 ± 1.1	1-5
Additional questions		
I would recommend the App to a colleague	4.0 ± 0.9	1-5
I think the information included in the App is credible	4.5 ± 0.6	3-5
I think the information included in the App is useful	4.5 ± 0.6	3-5
I think the information included in the App is too long	2.8 ± 1.0	3-5
I think the App provides too much information	3.4 ± 1.2	1-5
Using the App will enhance current approaches to PIED use within my profession	3.6 ± 1.1	1-5
I would be prepared to invest time, energy and work in using the App in future	3.4 ± 1.3	1-5

Table 17 *Experiences of using the app*

Participants were asked to reflect on how they thought that the use of the app would help other people in similar professional roles, and these findings are summarised in the Table below (Table 18). It was believed that the app would be useful across all outcomes, with very few people believing that the app held very little value for the specified outcomes.

Learning outcomes	Percentage endorsing response [%]			
	Very little	Some what	Quite a bit	Very much
Access unbiased information on PIEDs	10.5	5.3	42.1	42.1
Understand the different types of PIEDs and their uses	0.0	26.3	21.1	52.6
Understand the health risks associated with PIED use	5.3	5.3	10.5	78.9
Gain knowledge to help advise those at risk of using PIEDs to avoid use	0.0	10.5	52.6	36.8
To promote harm minimisation among users of PIEDs	0.0	21.1	57.9	21.1
Empower individuals to make informed choices about PIEDs	0.0	15.8	47.4	36.8
Encourage athletes and fitness participants take responsibility for their decisions concerning PIED use	5.3	15.8	15.8	63.2
Understand the WADA status of doping substances	0.0	15.8	26.3	57.9

Table 18 *Perceived learning outcomes*

Participants were also asked about their general skills in using the internet to obtain information about PIEDs that could be useful in their work (Table 19). This was assessed in order to understand participant self-efficacy in use of the Internet as a learning platform. Overall, whilst the majority agreed or strongly agreed that they were able to undertake the specified item, the most frequently endorsed response was being undecided about whether they possessed that skill, suggesting that a dedicated app such as Safe You might be a preferable and more easily accessible source of information.

	Percentage endorsing response [%]				
	Strongly disagree	Disagree	Undecided	Agree	Strongly Agree
I know what PIED resources are available on the Internet	0.0	15.8	**52.6**	31.6	0.0
I know where to find helpful PIED resources on the Internet	0.0	21.1	**47.4**	26.3	5.3
I know how to find helpful PIED resources on the Internet	0.0	10.5	**47.4**	36.8	5.3
I know how to use the Internet to answer my questions about PIED	5.3	10.5	**52.6**	31.6	0.0
I have the skills I need to evaluate the PIED information resources I find on the Internet	0.0	15.8	**47.4**	26.3	10.5

Table 19 *Skills in using internet*

7.2.4 Safe You App

A total of 10 interviews were conducted with individuals who had completed the fitness industry module. The interview revolved around the characteristics of the Safe You App. The App provides information on a wide range of substances used by athletes to increase muscle mass and endurance, control weight and boost energy. For each substance, the App provides information about the associated health risks (short and long term risks), and the WADA status (i.e., prohibited or not by WADA). Furthermore, information on the medical use and recommended dosage for medical use are provided. In addition, the common side effects from using these substances are presented.

Participants included those that worked in a gym setting (n = 5), personal trainers and/or coaches (n = 4) and a gym owner (n = 1). One also reported being a dietician. All were aware of PIED use among their clients/patients.

Module coherence, effectiveness and compatibility

We explored how participants made sense of and understood the module, whether it provided a coherent and distinct learning intervention (i.e. coherence) and whether the tool met their expectations in a way that would aid its future acceptance and effective use (i.e. affective attitude and perceived effectiveness).

Describing the module

There was coherence in how participants described the App and all found it easy to describe. It was felt to provide '*categorised*' knowledge on various PIEDs and their effects, in a way that was regarded as 'clear' and '*easy*' to comprehend. It was regarded as 'complete' and 'easy' to use, and when asked to describe it, some expressed their eagerness (e.g. '*excitement*') to take part, defining the App as '*interesting*'.

Quote 61

'It provided a lot of information gathered at the same place and I found it very interesting'

(Personal trainer/coach 5, Greece)

Quote 62

'*Information for every substance, categorized and complete'*

(Gym instructor 5, Greece)

The majority of participants described their main response to PIED use as 'prevention' (e.g. '*prevention, someone who will see the app can be discouraged from using'*) and all felt that the App fit with this approach by allowing them to share information on use and harms that would help persuade those using to cease use. Of those that focussed on harm reduction (e.g. 'first I would say the reduction of the harms and as a consequence I would say prevention'), the App was also felt to be useful in informing clients on the potential harms of use, and in turn, reducing the likelihood of such harms being experienced. However, as shown in quote 63, some did question whether the provision of information would in reality prevent use.

Quote 63

'I don't know if the client would avoid the use. It will help the gym instructor to know the effects and use it for prevention but the final decision is their owns'

(Gym instructor 6, Greece)

Expectations

Whilst not all had clear expectations of what to expect and what the benefits of the using the App would entail, all reported positive experiences. For some the App had provided new knowledge *(e.g. feeling 'more informed')*, and for others, it provided reassurance of their existing knowledge. Some reported that their expectations had been exceeded in that the information was more detailed than they had envisaged (see quote 64). Other than one individual who had expected the provision of additional references to further their self-directed learning, all felt that the content was complete and none provided recommendations for additional content.

Quote 64

'*It was better than expected. I expected it to be more simple, with less information, less substances but it was more informed'*

(Gym i*nstructor* 5, Greece)

Distinctiveness

Participants mentioned being informed for doping by informal means such as presentations at conferences and congresses (n = 2), and internet (n = 7). Five participants reported awareness through lectures at postgraduate courses (n = 5) providing information on the effects of doping on health and performance.

Some had no prior knowledge on PIEDs and had not engaged in other learning resources, and as such, the App provided a new and distinct source of learning. For those that had engaged in prior learning, the content itself was not felt to differ, but the platform through which it was presented was felt to be distinctive and beneficial. An App based resource was reported as providing a useful, simple and accessible format in which to engage with a range of information. As shown in quote 65, it was also felt to be unique in that it pulled together information on PIEDs into one source, that could be easily accessed at the participants convenience (see quote 66).

Quote 65

'I saw information I had heard in other seminars but there they were all together in a simple way and you could find what you were looking for easily'

(Gym owner 4, Greece)

Quote 66

'Yes, everything was organized and gathered all together. I had done some lessons at the university but with the app you have access anytime you want.

(Gym i*nstructor* 8, Greece)

Some felt that the App would become their main source of information on PIEDs given its ease of use and access. Others highlighted that although it would not replace more traditional learning formats such as face to face seminars, it would be used alongside them as a way '*reinforce[ing] [their] knowledge because of the immediate access'* to a range of information as and when it was required. Others suggested that the App provided the basics, and as such would be used alongside other sources.

Perceived effectiveness and compatibility

The effect of using the App on participants' knowledge and professional practice was not measured, but we did explore the self-reported and anticipated effectiveness. All felt that the App would be beneficial to themselves and others working in the fitness industry. It would allow them to apply their knowledge to interactions with clients and pass on information to those that use or may be inclined to use PIEDs. Reflecting how the App was felt to fit within the aims of both prevention an harm reduction (quote 67), most felt that clients would benefit from their use of the App, through the provision and sharing of information which may assist in preventing use and harms, and by '*influencing him/her to make the right decision'*. As highlighted in quote 67 and 68, as such, most perceived the provision of information as adequate in encouraging behaviour change and in preventing use.

Quote 67

'It can be used to inform the trainer and to prevent someone's willingness to use but it can be used from someone that would want to use such substances in order to gain more information. We could focus on why someone is willing to use and provide him information on its harms'

(Personal trainer/coach 5, Greece)

Quote 68

'The knowledge of knowing. If we have the knowledge we can change their decision with facts'

(Gym instructor 8, Greece)

There was consensus across professions that the main effect and advantage of completing the module was increasing knowledge. The main gap in knowledge filled was gaining information on new and a vast amount of substances and the consequences of use. As shown in quote 69 and 70, of importance, is how participants reported feeling confident in approaching and discussing use with their clients following the use of the App due to their increased knowledge. Participant's felt that the App had the potential for wider use age outside of the fitness industry, and discussed it as being useful to the wider fitness, medical, health and education sectors. The App was felt to be useful to dieticians, doctors, physiotherapists, psychologists, pharmacists, and schools.

Quote 69

'I would approach them discreetly and ask them. Till now I couldn't intervene because ï don't had the knowledge'

(Gym instructor 6, Greece)

Quote 70

'The approach is really important to be in a friendly conversation and not in a judgemental way'

(Personal trainer/coach 5, Greece)

Required effort, user commitment and self-efficacy

Overall, participants reported feeling that the App was a '*very good idea*' given that there is a '*lack of knowledge on this matter* [PIEDs]' in their profession. All had used the App in their own time, and as such, had not yet used it during their day to day professional practice. Most felt that the App would be useful in their future practice and all discussed how they would recommend using the App to their colleagues, and some had already done so. Use of the App was regarded as involving minimal additional effort ('some time') and other than one individual who felt they would not have the time to use it in future, all reported that they would be prepared to invest time, energy and work in using the App. However (see Barriers section), a lack of time was reported as the main barrier to future use. As previously discussed, the content was regarded as clear and easy to understand, which suggests a high degree of self-efficacy among participants, even among those with no prior knowledge. Whilst some felt that the senior management within their place of work would support the use of the App and most felt that it could become routine practice, for reasons such as '*to promote health*', others felt that gym owners would only endorse the App if they had '*seeming to gain*' from its use. As shown in quote 71, it was also suggested that different professions had different purposes for using the App, and that some gyms may endorse the App in way that may encourage use.

Quote 71

'Some gyms like those promoting body building would use it for informing their clients on how to use them, , while at a club with young athletes the App could be used for prevention'

(Personal trainer/coach 5, Greece)

Barriers and future implementation

Very few barriers to the future implementation and effective use of the tool were discussed, suggesting a general acceptance of the tool within the fitness profession. At the individual level, it was suggested that use would be dependent on the individuals motivation to use the App and an awareness of its usefulness and relevance to their work (see quote 72). Few changes to the App itself where suggested, but as shown in quote 73, some did suggest that although an App based learning resource was useful, having more immediate access whilst on the go within their working day through access via other devices (e.g. training

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watch) would be beneficial. One individual suggested that the App should include references for further reading to direct people who use to additional resources to further enhance their knowledge.

Quote 72

'The willingness to know and learn more information. Some instructors don't realize the value of knowing more on this topic'

(Gym instructor 6, Greece)

Quote 73

'To have immediate access and use the app like our watch-everywhere needed'

(Gym instructor 6, Greece)

To facilitate the effective implementation of the module in their workplace in the future, it was also suggested that at the organisational level, seminars should be held based on the content and that clients themselves should be directed and encouraged to use the App. As shown in quote 74, the main barrier to future use was time, and it was suggested that more time was needed to interact and discuss use with clients, to allow for the knowledge learned to be shared with and applied to interactions with clients.

Quote 74

'Time. Clients need fast and short information's to be convinced. In order to convince them you need more time'

(Gym instructor 5, Greece)

Summary

Interviews (N = 10) were conducted with individuals who completed the Safe You fitness App to gain insight into its acceptability, usability and implementation. Overall, it appeared that the App was accepted and understood by all participants. It provided a clear and easy to use PIED resource that for most, was distinct from other resources and unique in that it was easily accessible. There was consensus that using the App would increase knowledge, provide information that could be passed onto clients who use PIEDS, and that it would increase their professional competence and confidence when interacting with clients who may use. It provided new knowledge for those with little prior learning and filled gaps in knowledge for others. For some, it provided reassurance of their existing knowledge.

Generally, the module content appeared to be compatible with existing practices and individual and organisational values of both preventing use and reducing harm. All had put time a side to use the App, yet in their free time. Participants felt that the module was needed, that is was a good idea and they were prepared to invest time, effort and work into it. Few barriers to future use were discussed but included a lack of time and dedicated work time to use the tool and apply their learning to interactions with clients, and unawareness that the module was relevant to their work. Few suggested changes to the module itself and as such, it appears that the module requires little adaptation for it to be accepted by and effectively used by those working in the fitness industry.

8. Conclusion

Overall, participants reported that the modules and App were useful resources to assist in increasing knowledge of PIEDs among diverse groups of professionals who come into contact with people who use such substances. Engagement with the tools was high and most participants had been able to dedicate time to complete them, and had invested time and effort to use them, and complete the associated research materials. Findings from both the survey and interviews found that all tools were regarded as clear and easy to use and understand, and that participants felt they were distinct from other PIED resources. Results from all three surveys found that participants felt using the tool would help them achieve the tools' intended learning outcomes.

Interview data suggested that the tools were accepted and compatible with the existing practices and values of participants, and their organisation's values, with those working in the health care and fitness sector acknowledging their role in supporting practice to reduce the harms of PIED use, and in preventing use. Whilst most of those participating in the fitness module felt that they had a responsibility to inform and communicate the harms of PIED use with clients, a minority did not feel that the module would meet these goals. Moreover, a small number of Lithuanian interviewees did not feel that it was their responsibility to intervene in client's PIED use.

The health care module was generally well received by participants from varied backgrounds, yet this tool will require further adaption. For participants in some countries (UK, ND) a lack of harm reduction messages within the module was the main barrier to its applicability and usefulness. Moreover, whilst the tools generally met the expectations of most, there was a lack of clarity with regards the aims of the health care module among those who were not primary or secondary care physicians. This reflects the development of the module, which was originally designed to target medical professional's such as doctors, which meant that the content was too scientific for those from other professions (e.g. drugs workers, harm reduction workers). As such, the health care module will require further adaption to target and fit the needs of professionals working in specific health sectors.

Whilst interviewees felt that they would use the tools in the future, there was less agreement among e-module survey participants that they would be likely to use the module again over the next 12 months. This may not be unsurprising considering interview participants also reported that the module met their expectations and learning needs. There was some agreement among Safe You App survey participants that they would be likely to

use the app in the next 12 months. This was to be expected as the app is a reference tool that contains information on pharmaceuticals and nutritional supplements, and so would be consulted when needed.

A number of barriers to the future acceptance and effective use and implementation of the tools were identified. A lack of time to use the tools was discussed as the main barrier, which explains why most had used the tools in their own time. A lack of awareness within the health care sector and fitness industry that the tools were relevant to their work was also discussed as preventing its uptake, and so the need to raise awareness of PIED use as a health issue, as well as more active promotion of the tools, was required. Overall, the Safe You App was widely accepted and received more positively with fewer perceived barriers to future use and fewer changes to the app itself required. However, survey results found less agreement that among fitness professionals that senior management would support the use of the Safe You App. A number of changes to the tools themselves related to content, presentation and functionality were suggested and are discussed in more detail in the recommendations and considerations section below.

This project wasn't designed to evaluate the effectiveness of any of the tools assessed in improving specified learning outcomes, improving the practice of users, or the health of people who use PIEDs. Whilst the current research was an important developmental step, it is important that future work investigates these types of outcomes, as there is a notable lack of research on the effectiveness of PIED interventions. Whilst there are a growing number of mobile learning/training apps and online health resources, few of these have been subject to evaluation, ineffective resources present an opportunity cost, and there is also the possibility that improper use or application of learning may lead to unintended outcomes for users (McKay et al., 2019). There has also been little consideration of appropriate research designs for investigating learning outcomes of electronic resources, or the feasibility of undertaking these type of evaluations (McKay et al., 2018). Some taxonomies and scales have been designed to assess aspects of resources such as the included behavioural change techniques used, or the quality and functionality of materials (Stoyanov et al., 2015); indeed this project included a number of assessments of module/app usability.

Once the recommended adaptations to the resources have been completed (see Section 9), the next stage is this work should aim to assess the effectiveness of the adapted resources. However, some partner countries reported difficulty in recruiting relevant professional groups for the current research, and the size of the potential professional user group is unknown. It is therefore recommended that a feasibility study should be undertaken,

leading to a pilot study or full trial. This would assess aspects of full study design such as the willingness of participants to be randomised to the new resources compared to education/training as normal. This is pertinent because findings from the current study suggested that there was a high level of demand for a PIED training resource, and so participants may not accept randomisation/allocation to a control group. Other study features that need further investigation include the identification or appropriate control interventions (e.g. existing learning resources); estimates of the number of eligible participants (i.e. the number of professionals who would benefit from further support); estimated follow-up and response rates; the use of incentives to recruit and retain participants; refinement and characteristics of proposed outcome measures (e.g. self-reported or objectively determined change in knowledge; [observed] changes in practice or client engagement); the time needed to collect data. Only when feasibility criteria have been satisfied should a pilot or full study be undertaken to assess effectiveness.

9. Recommendations and considerations

A number of practical recommendations and considerations are outlined below that require addressing to assist in the future implementation, acceptance and effectiveness of the modules.

9.1. Health professional module

Module content and adaptation by profession and cultural context

1. The content should be peer reviewed to ensure that there are no factual inaccuracies before it is rolled out and its effects on knowledge and practice evaluated. It is important to ensure that content is based on scientific evidence and not popular beliefs to prevent popular myths being reinforced. The module requires ongoing updating in line with new scientific evidence.

2. Practical information on what health care workers are legally allowed to do should be included (e.g. can a GP send PIEDs to a lab for testing, can they prescribe bloodwork, Tamoxifen and Cialis to encourage a patient to cease use steroids. This information will be country specific).

3. Referral information could be included to assist the professionals in referring clients to other services.

4. The modules present information in a way that suggests an architype 'PIED-user' exists. Research suggests otherwise and the module should differentiate different groups who use PIEDs by motives, use of PIEDs and levels of health literacy. Whilst the different typologies of those using are briefly discussed, additional information is required to assist health care workers to adjust their approach to the differing.

5. Whilst the module aims to provide information on PIED use, the majority of the content discusses anabolic steroid use. Additional content is required to better reflect the real life use of various substances (e.g. illegal weight loss substances).

6. It is important that the language used within the module is assessed to ensure that it is culturally sensitive to prevent potentially stigmatising language and beliefs being reproduced and passed on by health care professionals in a way that impedes PIED user engagement with health care services. A number of participants suggested certain words should be exclude (e.g. 'Doping', UK) Language is important to ensure health care workers are culturally competent in interacting with patients/clients who use PIEDs in a non-judgemental and effective manner. Although, the module does include some information aimed at increasing the cultural competence of health care workers to aid non-judgemental responses, this could be further developed.

7. The voice of people who use PIEDs is currently missing from the module. They should be consulted on the module content and use of language, and short biographies and interviews could be included to help health care workers understand the motives of use, user concerns and barriers to accessing health care services.

8. In their current form, the module provides a "one size fits all" format which has been slightly adapted to fit each countries cultural context. To aid effective roll out and implementation, the content should be tailor made to fit differing professionals, the educational background and existing knowledge and the goals of particular professions. For example, different versions of the health professional module could be designed aimed at medical professionals (e.g. clinicians), front of house medical staff (e.g. paramedics, nurses), and health care workers with a non-medical background (e.g. psychologists, social workers, substance use workers, needle exchange workers).

    - The module requires careful adaption if it is to be successfully rolled out and used by those working outside of the professions to which it was originally targeted (e.g. medics). The main content issue discussed by participants working within wider health acer settings was the overly scientific nature of the content, which was felt not to be required in their day to day practice. The module should be simplified and shortened to increased acceptance among and usefulness among such groups.

    - Within each tailor made module, individuals should be given the option of choosing between an 'extended' course and 'short' course which provides differing levels of detail and complexity based on their existing knowledge.

    - Regardless of profession, the module should incorporate more harm reduction messages. For example, the module should include advice that will provide the necessary information and knowledge for professionals to assist people who use PIEDs in being healthy without insisting on the discontinuation of use (e.g. bloodwork, injection protocols, post cycle therapy (PCT), 'good' and 'bad' ways to cycle). Information should also be included on how to effectively and safely respond to side effects of PIED-use (e.g. responding to disturbed cholesterol (high LDL, low HDL), treating high haematocrit, treating erectile dysfunction and/or loss of libido). Whilst the extent to which each collaborating partner organisation engages with harm reduction varies, such information is essential in providing professionals with the necessary skills and knowledge to improve the health of those using PIEDs. In countries such as The Netherlands and the UK, a harm reduction approach is mainstream or less controversial than in other countries. In such countries, the harm reduction messages within the

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module should be more explicit and appropriate to the use practices within each countries. For example, harm reduction advice around injecting is more applicable to the UK where some individuals using AS access needle and syringe exchanges, compares to in The Netherlands where injecting and use needle/syringe exchange at drug service facilities appears to be uncommon. Due to different organisational ideologies (e.g. harm reduction, anti-doping, and cessation) and user practices, some countries may choose to omit such content. However, we advise that such content is included as an optional component for module users to engage with if they choose.

Module interface and technical considerations

1. At present the module appears as a 'paper' or text book course online. More interactive elements were requested by participants and should be incorporated (e.g. immediate feedback on quiz questions, short animations, and search function). This will allow the module to be presented as a 'digital' course and make it more user friendly and engaging. More interactive components would help maintain interest in the content, boost learning and reduce the amount of time required to read the content in its current form.

2. Short quizzes and tests between sections rather than assessment at the end of the module would be more beneficial in aiding self-assessment and learning.

3. The provision of PowerPoint slides containing a more concise version of key messages was requested by some participants and could be used in training with colleagues could help aid peer to peer learning.

4. A function should be included that allows module users to download and print PDF's for future use in practice. This was requested by a number of participants.

5. Whilst the format of an online module was useful in participants self-directed learning, they also reported that they would benefit from the content being adapted and presented in a way (e.g. interactive website) that would allow it to be used as a resource within real time interactions with clients/patients.

6. The process of accessing the module should be simplified. At times, module users in the UK and The Netherlands experienced problems logging into the module. Access was also hindered by access verification emails being in Finnish, which meant at times they were delivered to user 'trash' or 'junk' email boxes, or perceived as trash and as such disregarded by participants. Hosting the module on country specific platforms may improve access.

Accreditation and access

7. Given the time burden involved in completing the module, gaining accreditation for the module may boost participation. This would also help gain organisational support for module completion and justify the provision of dedicated work time to complete it.

8. Presenting the module as an open online course could boost participation. This would not only disseminate information and enhance knowledge on a wider scale but the larger usage would aid in measuring the effect of the module on user knowledge and professional practice.

Raising awareness

9. A lack prior knowledge on PIEDS among health care workers can mean that some aware unaware of PIED use as a public health issue and do not see the module as relevant to their profession. It is important to promote the message of PIED use as a public health issue of relevance to a wide variety of professionals to encourage engagement with professional learning around PIEDs, including the module.

10. As suggested by a number of participants, module should more clearly outline the ways in which PIED use is a public health issue and the role of certain professions in addressing it (i.e. on the landing page), to encourage people to complete it.

11. Once adapted, the module itself should be more actively advertised among key target groups.

9.2. Fitness industry module

1. **Content.** Additional content could be added to the module to meet user needs. For example, a more information on food and nutritional supplements and their interactions, and more information specifically outlining how to '*recognize a user'*.

2. **Module interface:** Whilst most had access to computers at work, providing a smart phone version of the module was noted as being advantageous to those working in the fitness sector.

3. **Raising awareness:** It is important that awareness of PIED use among fitness enthusiasts and the role of the fitness industry in addressing use and harms is increasing to encourage use of the tool. Participants also felt that the module requires more active marketing to encourage use.

4. **Gaining organisational support:** It is important that organisational support is gained to promote use of the module among those working in the fitness industry. Most participants discussed time restraints impacting on their ability to use the module. Such support would help secure dedicate time for employees to use the module in working hours.

5. **Technical:** The process of accessing the module should be simplified to encourage use.

9.3. Safe You Fitness App

1. **Raising awareness:** it is important that awareness of the Apps relevance to the fitness industry promoted to encourage use. This includes raising awareness of PIED use among fitness enthusiasts and the role of the fitness industry in addressing use and harms is increasing to encourage use of the tool.

2. **Changes to the App:** providing access via other devices to support the immediate access and use during users working day (e.g. via training watches) would be beneficial. Participants also suggested that providing references for further reading to direct users to additional resources would be useful in encouraging further self-directed learning and further enhancing their knowledge.

3. **Other formats:** based on user feedback, App could provide guidance on how its content could be used to inform work placed seminars based on its content to reach a wider audience.

4. **Dedicated work time:** Dedicated work time should be provided to complete the App, as having time to use the App was a key issue discussed by participants. They also felt that more time provided to interact and discuss use with clients, to allow fitness professionals to pass on the knowledge learned to clients who may be using, or those that may be considering initiating use.

9.4. Future evaluation of the amended tools

The research did not formally assess the effectiveness of the tools in improving participants' knowledge and professional practice, or in changing PIED user behaviour and health outcomes. To inform the future implementation and evaluation of the module in this regard, the following should be considered:

1. A feasibility study should be undertaken to address uncertainties in effectiveness study design and delivery. This can be embedded in a programme of work that culminates in a pilot study or full effectiveness trial.

2. Key study characteristic to be assessed as a minimum include optimal study design (e.g. (non-)randomised controlled trial, natural experiment); recruitment and retention of participants; comparison interventions (other training interventions, participants own self-directed learning); and primary outcomes (e.g. self- or assessed changes in knowledge and practice; health and behaviour of people who use, or at higher propensity to use, PIEDs).

10. References

Abbate, V., et al., (2015). Anabolic steroids detected in bodybuilding dietary supplements – a significant risk to public health. *Drug Test. Analysis*, 7, 609–618.

Advisory Council for the Misuse of Drugs (2010a). *Consideration of the Anabolic Steroids. London (UK).* Available at: www.gov .uk/government/uploads/system/uploads/attachment _data/file/119132/anabolic-steroids.pdf. Accessed 01.07.2019.

Advisory Council on the Misuse of Drugs (ACMD). (2010b). *Consideration of the Anabolic Steroids.* London: The Stationery Office.

Anti-doping e-learning platform (ADeL). (2017). E-learning platform created by The World Anti-Doping Agency (WADA). https://adel.wada-ama.org/.

Backhouse, S. H., et al., (2014). Study on doping prevention: A map of legal regulatory and prevention practice provisions in EU 28. Luxembourg: Publications Office of the European Union.

Bates et al., (2017a). HIV among people using anabolic steroid in the United Kingdom: an overview. *HIV Nursing,* 17(1), 1474- 7359.

Braun, V. and Clarke, V. (2006) 'Using thematic analysis in psychology', *Qualitativ Research in Psychology*, 3(2), 77-101, available: http://dx.doi.org/10.1191/1478088706qp063oa.

Braun, V. and Clarke, V. (2014). 'What can "thematic analysis" offer health and wellbeing researchers?', *Int J Qual Stud Health Well-being*, 9, 26152, available: http://dx.doi.org/10.3402/qhw.v9.26152.

Christiansen, A. V., et al., (2016). Outline of a typology of men's use of anabolic androgenic steroids in fitness and strength training environments. *Drugs: Education, Prevention and Policy*, 24(3), 295-305.

Crime Survey of England and Wales (2018) Drug Misuse: Findings from the 2017/18 Crime Survey for England and Wales. London: Home Office. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/729249/drug-misuse-2018-hosb1418.pdf. Accessed 02.07.2019

EHFA (European Health and Fitness Association). (2011). Fitness against doping. Interim Report. https://www.virke.no/globalassets/bransje/bransjedokumenter/ehfa.pdf/. Accessed 15.11.2019.

Doping Autoriteit. (2001) Eigen Kracht. Campaign site of the Anti-Doping Authority Netherlands. https://www.eigenkracht.nl. Accessed 15.11.2019.

European Union. (2007). The EU White Paper on Sport. Available at https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52007DC0391&from=EN Accessed 17.10.2019

European Union. (2014) Study on Doping Prevention. A map of Legal, Regulatory and Prevention Practice Provisions in EU 28. Available at http://ec.europa.eu/assets/eac/sport/news/2014/docs/doping-prevention-report_en.pdf Accessed 17.10.2019

Evans-Brown, M. et al., (2012). Human Enhancement Drugs - The Emerging Challenges to Public Health. North West Public Health Observatory, Liverpool.

Bates et al., (2017b). A systematic review investigating the behaviour change strategies in interventions to prevent misuse of anabolic steroids. *Journal of Health Psychology 1-18.* doi.org/10.1177/1359105317737607

Glass, R et al., (2019). Secondary distribution of injecting equipment obtained from needle and syringe programmes by people injecting image and performance enhancing drugs: England and Wales, 2012-15. *Drug and Alcohol Dependence,* 195, 40–44

Grundlingh, J. et al., (2011). 2,4-dinitrophenol (DNP): a weight loss agent with significant acute toxicity and risk of death. *Journal of medical toxicology: official journal of the American College of Medical Toxicology, 7*(3), 205-212. doi: 10.1007/s13181-011-0162-6

Hakkarainen, P. et al., (2018). Suomalaisten huumeiden käyttö ja huumeasenteet 2018. Tilastoraportti 2/2019. Terveyden ja hyvinvoinnin laitos

Heidet, M., et al., (2019). *Severe Hypoglycemia Due to Cryptic Insulin Use in a Bodybuilder. The Journal of Emergency Medicine, 56*(3), 279-281. doi:https://doi.org/10.1016/j.jemermed.2018.10.030

Hope, V.D. et al., (2015). Injection site infections and injuries in men who inject image- and performance-enhancing drugs: prevalence, risks factors, and healthcare seeking. *Epidemiol. Infect*, 143, 132–140.

Hope, V.D. et al., (2016). Risk of HIV and Hepatitis B and C Over Time Among Men Who Inject Image and Performance Enhancing Drugs in England and Wales: Results From Cross-Sectional Prevalence Surveys, 1992–2013. *J Acquir Immune Defic Syndr*, 1;71(3):331-7.

Hope, V.D. et al., (2017). Low levels of hepatitis C diagnosis and testing uptake among people who inject image and performance enhancing drugs in England and Wales, 2012- 15. *Drug and Alcohol Dependence,* 179, 83–86.

Hope, V.D. et al., (2016). Risk of HIV and hepatitis B and C over time among men who inject image and performance enhancing drugs in England and Wales: results from cross-sectional prevalence surveys, 1992-2013. *J Acquir Immune Defic Syndr* 2016;71:331–7.

Hope, V.D. et al., (2013). Prevalence of, and risk factors for, HIV, hepatitis B and C infections among men who inject image and performance enhancing drugs: a cross-sectional study. *BMJ Open* 2013;3:e003207.

Kainulainen, H. (2011). Rangaistuskäytäntö dopingrikoksissa. Oikeuspoliittisen tutkimuslaitoksen tutkimustiedonantoja 110, Helsinki. Available: https://helda.helsinki.fi/bitstream/handle/10138/152502/TTA110_Kainulainen_2011.pdf?sequenc=1&isAllowed=y

Kimergard, A. and McVeigh, J. (2014). Variability and dilemmas in harm reduction for anabolic steroid users in the UK: a multi-area interview study. *Harm Reduction Journal,* 11(19), 1-13.

Lazuras, L. et al., (2010). Predictors of doping intentions in elite-level athletes: a social cognition approach. *Journal of Sport and Exercise Psychology*, *32*(5), 694-710.

Lazuras, L. et al., (2017). "I Want It All, and I Want It Now": Lifetime Prevalence and Reasons for Using and Abstaining from Controlled Performance and Appearance Enhancing Substances (PAES) among Young Exercisers and Amateur Athletes in Five European Countries. *Frontiers in psychology*, *8*, 717.

McKay, F. H., et al., (2019). Using Health and Well-Being Apps for Behavior Change: A Systematic Search and Rating of Apps. *JMIR Mhealth Uhealth, 7*(7), e11926. doi:10.2196/11926

McKay, F. H., et al.,(2018). Evaluating mobile phone applications for health behaviour change: A systematic review. *J Telemed Telecare, 24*(1), 22-30. doi:10.1177/1357633x16673538

McVeigh, J. and Begley, E. (2016). Anabolic steroids in the UK: an increasing issue for public health. *Drugs: Education, Prevention and Policy*, 24(3), 278–285.

McVeigh, J., et al., (2012). Human enhancement drugs and the pursuit of perfection. *Adiccione*s. 24(3):185-90.

Murray, E. et al., (2010). Normalisation process theory: a framework for developing, evaluating and implementing complex interventions. *BMC Medicine*, 8:63.

Official Statistics of Finland (OSF): Prosecutions, sentences and punishments [e-publication]. ISSN=2343-1679. Helsinki: Statistics Finland. Available at: http://www.stat.fi/til/syyttr/index_en.html

Outram, S. and Stewart, B. (2015). Doping trough supplement use: a review of the available empirical data. Int J Sport Nutr Exerc Metab. 2015;25(1):54-9

Pope, H., et al. (2014a). The lifetime prevalence of anabolic-androgenic steroid use and dependence in Americans: Current best estimates. *The American Journal on Addictions* 23: 371–377.

Pope, H. et al. (2014b). Adverse health consequences of performance-enhancing drugs: An endocrine society scientific statement. *Endocrine Review* 35: 341–375.

Pope, H. et al., (2004). Anabolic steroid users' attitudes towards physicians. *Addiction*, 99, 1189–1194.

Real Winner. (2008). Anti-doping training programme developed by Antidoping Norway and Anti Doping Denmark. https://www.realwinner.org/

Rose, R., et al., (2016). "No pain, no gainz"? Performance and image-enhancing drugs, health effects and information seeking. *Drugs: Education, Prevention and Policy* 24(5): 400-408.

Sagoe, D., et al., *(2014).* The global epidemiology of anabolic-androgenic steroid use: a metaanalysis and meta-regression analysis. *Ann Epidemiol* 24, 383–398.

Salasuo, M. and Piispa, M. (2012). Kuntodoping: Näkökulmia dopingaineiden käyttöön huippu-urheilun ulkopuolella. Nuorisotutkimusseura/ Nuorisotutkimusverkosto, julkaisuja 120.

Seear, K. et al., (2015). Understanding and responding to anabolic steroid injecting and hepatitis C risk in Australia: A research agenda. *Drugs: Education, Prevention and* Policy, 22(5), 449-45

Stoyanov, S. R., et al.,. (2015). Mobile App Rating Scale: A New Tool for Assessing the Quality of Health Mobile Apps. *JMIR Mhealth Uhealth, 3*(1), e27. doi:10.2196/mhealth.3422.

Hakkarainen, P, et al., (2014). Huumausaineiden ja kuntodopingin käyttö ja niitä koskevat mielipiteet Suomessa vuonna. *Yhteiskuntapolitiikka* 80. 2015:4

Karjalainen, K, et al., (2019). Suomalaisten huumeiden käyttö ja huumeasenteet 2018. Tilastoraportti 2/2019. Terveyden ja hyvinvoinnin laitos.

Sekhon, M., et al., J. (2017). Acceptability of healthcare interventions: an overview of reviews and development of a theoretical framework. *BMC Health Services Research*, 17:88.

Stubbe, J. H. et al., (2014). Prevalence of use of performance enhancing drugs by fitness centre members. *Drug testing and analysis, 6*(5), 434-438.

van der Bijl, P. and Tutelyan, V.A. (2013). Dietary supplements containing prohibited substances. *Vopr Pitan* ;82(6):6-13.

Van de Ven, K. et al., (2019): The modes of administration of anabolic-androgenic steroid (AAS) users: are noninjecting people who use steroids overlooked?, *Drugs: Education, Prevention and Policy*, DOI: 10.1080/09687637.2019.1608910.

Van de Ven, K., et al., (2018). Health risk and health seeking behaviours among people who inject performance and image enhancing drugs (PIEDs) who access needle syringe programs in Australia. *Drug and Alcohol Review*, 37(7), 837-884. DOI: 10.1111/dar.1283.

Van de Ven, K. (2016). 'Blurred lines': Anti-Doping, national policies, and the performance and image enhancing drug (PIED) market in Belgium and the Netherlands. *Performance Enhancement & Health*, 4(3), 94-102.

Zahnow, R. et al., (2017). Adverse effects, health service engagement, and service satisfaction among anabolic androgenic steroid users. *Contemporary Drug Problems*, 44 (1), 69-83.

Zahnow, R. et al., (2018). Identifying a typology of men who use anabolic androgenic steroids (AAS). *International Journal of Drug Policy* 55, 105–112.

11. Appendix

11.1. Research invitation email

RE: Evaluating the acceptability of a Performance and Image Enhancing Drugs [e-learning module/App] among [health care providers/fitness industry representatives]

Dear [insert name]

I write to invite you to participate in a research project entitled '*Evaluating the acceptability of a Performance and Image Enhancing Drugs [e-learning module/App]* being funded by the European Commission's ERASMUS+ programme and carried out by *[Public Health Institute, Liverpool John Moore University]*.

The project aims to test the acceptability, utility, and implementation of an [online e-learning module/App] designed to support professional learning in [healthcare providers/fitness industry representatives] in helping to prevent performance and image enhancing drug (PIED) use and harms among recreational athletes.

Participation will involve:

1. Completing the [e-learning module/App] in the period [insert relevant dates for WP 3 or 4]. It will take no longer than [Insert time] to complete.

2. Completing an online survey in [Insert relevant dates for WP3 or 4] which will take no longer that 20 minutes to compete and ask you about your experience of using the [e-learning module/App].

3. You will then be asked whether you wish to take part in a follow up in [Insert relevant dates for WP 3 and 4] interview which will take no longer than 30 minutes to complete and can be conducted in person at a location of convenience to yourself or via telephone.

Your participation in the research is confidential and will play an important role in developing new resources which will allow better, evidence-based responses to support users of PIEDs and to reduce the harms of use.

Please read the participant information sheet attached to this email and contact me if you have any further questions.

Kind Regards,

[Insert name]

Title of Project: *Evaluating the acceptability of a Performance and Image Enhancing Drugs e-learning module among [health care providers/fitness industry representatives]*

Name of Researcher and School/Faculty: [ADD]

You are being invited to take part in a research study. Before you decide it is important that you understand why the research is being done and what it involves. Please take time to read the following information. Please ask if there is anything that is not clear or if you would like more information. Take time to decide if you want to take part or not.

1.   What is the purpose of the study?

The [*Public Health Institute] at [Liverpool John Moores University]* is conducting research funded by the European Commission ERASMUS+ programme that aims to help develop a new online e-learning module/App designed to support professional learning in those working to prevent performance and image enhancing drug (PIED) use amongst recreational athletes and fitness enthusiasts, and to reduce the harms associated with use.

2.   Do I have to take part?

No. Participation is voluntary and it is up to you to decide whether or not to take part. If you do you will be provided with further information within the survey. By completing the survey you provide your consent.

You are free to withdraw at any time and without giving a reason, by contacting [ADD] and providing the last 3 digits of your postcode. A decision to withdraw will not affect your rights to participate in any future research or intervention.

3.   What will happen to me if I take part?

If you decide to take part, you will be asked to take:

1.   Complete the [e-learning module/App] in the period [insert relevant dates for WP 3 or 4]. It will take no longer than [Insert time] to complete.

2. Complete an online survey in [Insert relevant dates for WP3 or 4] which will take no longer that 20 minutes to compete and ask you about your experience of using the [e-learning module/App].

3. You will then be asked whether you wish to take part in a follow up in [Insert relevant dates for WP 3 and 4] interview which will take no longer than 30 minutes to complete and can be conducted in person at a location of convenience to yourself or via telephone.

4. Are there any risks / benefits involved?

There are no risks and discomforts involved. Participation will require you to dedicate time to completing the [e-learning module/App] and online survey, and arranging a date to conduct the interview if you wish to do so. Participating in the research will provide you with the opportunity to enhance you professional learning on PIED use and harms, and will make an important contribution to the development of the tools.

5. Will my taking part in the study be kept confidential?

No one else will see your questionnaire other than the researchers who are doing the study. We do not ask your name but do ask you to provide your email address if you wish to take part in a follow up interview. You will also be asked to provide the last three digits from their post/zip code on the questionnaires so that if you decide to take part in a follow up interview, the research team will be able to link their questionnaire responses to the interview responses.

By completing the e-module and submitting the online questionnaire you are consenting to take part in the research.

This study has received ethical approval from [ADD]

Contact Details of Researcher: [ADD]

If you any concerns regarding your involvement in this research, please discuss these with the researcher in the first instance. If you wish to make a complaint, please contact [ADD if appropriate] and your communication will be re-directed to an independent person as appropriate.

11.3. Example follow up email with link to survey

RE: Evaluating the acceptability of a Performance and Image Enhancing Drugs [e-learning module/App] among [health care providers/fitness industry representatives]: online survey

Dear [insert name]

Thank you for testing the [PIED e-learning tool/App] as part of the research study '*Evaluation of the acceptability of a Performance and Image Enhancing Drugs [e-learning module/App].*

As you aware, the research is funded by the European Commission and is being carried out by [Public Health Institute, Liverpool John Moore University]. The project aims to help develop an [online e-learning module/App] designed to support professional learning in [healthcare providers/fitness industry representatives] in helping to prevent performance and image enhancing drug (PIED) use and harms among recreational athletes.

Now that you have tested the tool, we provide a link to the online survey which will ask a number of questions about your experience of using the [e-learning module/App]. It will take no longer that 20 minutes to compete and is to be completed before [insert date for WP 3 or 4]

Please find a link to the survey here; [insert link]

Please note that we may contact you at a future date to invite you to take part in a short follow up interview.

Your participation in the research is confidential and will play an important role in developing new resources which will allow better, evidence-based responses to support users of PIEDs and to reduce the harms of use

We look forward to hearing from you.

Kind Regards,

[Insert name]

11.4. Example interview recruitment email

RE: Evaluating the acceptability of a Performance and Image Enhancing Drugs [e-learning module/App] among [health care providers/fitness industry representatives]: interview

Dear [insert name]

Thank you for completing the online questionnaire which asked you about your experience of using the PIED [e-learning tool/App] as part of the research study '*Evaluating the acceptability of a Performance and Image Enhancing Drugs [e-learning module/App].*

Now that you have tested the tool and completed the questionnaire, we would like to invite you to take part in a short follow up interview about your experience of using the [e-learning tool/app] and its future implementation.

The interview should take no longer than 30 minutes to complete and can be conducted in person at a location convenient for yourself or via telephone.

Interviews will be digitally recorded and transcribed. All data will be anonymised and you will not be named in any of the written reports.

Your participation in the research is confidential and will play an important role in developing new resources which will allow better, evidence-based responses to support users of PIEDs and to reduce the harms of use

Please read the participant information sheet attached to this email and contact me if you have any further questions.

Kind Regards,

[Insert name]

Title of Project*: Evaluating the acceptability of a Performance and Image Enhancing Drugs [e-learning module/App] among [health care providers/fitness industry representatives]*

Name of Researcher and School/Faculty: Dr Amanda Atkinson and Professor Harry Sumnall, Public Health Institute, Liverpool John Moores University

You are being invited to take part in a research interview. Before you decide it is important that you understand why the research is being done and what it involves. Please take time to read the following information. Please ask if there is anything that is not clear or if you would like more information. Take time to decide if you want to take part or not.

4. What is the purpose of the study?

Public Health Institute at Liverpool John Moores University is conducting research funded by the European Commission that aims to test the acceptability, utility, and implementation of an online [e-learning module/App] designed to support professional learning in *[health care providers/fitness industry representatives]* working to prevent performance and image enhancing drug (PIED) use among recreational athletes and fitness enthusiasts.

You have already completed the [e-learning module/App] and taken part in an online survey. We now invite you to take part in an interview with the aim of gaining more information on your experiences on the e-learning tool.

5. Do I have to take part?

No. Participation is voluntary and it is up to you to decide whether or not to take part. If you do you will be given this information sheet and asked to sign a consent/e-consent form.

You are still free to withdraw at any time and without giving a reason. A decision to withdraw will not affect your rights to participate in any future research or intervention.

You can withdraw of the research by contacting [ADD]

6. What will happen to me if I take part?

If you decide to take part, you will be asked to take part in an interview either in person at a location convenient for yourself (e.g. your work location) or via telephone to discuss your experiences of using the [e –learning tool/App] designed to support the professional learning of health care professionals on the use of performance and image enhancing drug (PIED),.

Interviews will be conducted between [x and x]

7. Are there any risks / benefits involved?

There are no risks and discomforts involved. Participation will require you to dedicate time to conducting the interview. Participating in the research will provide you with the opportunity to discuss your experience of using the [e-learning tool/App] with the aim of informing its future implementation in the prevention of PIED use and associated harms.

8. Will my taking part in the study be kept confidential?

Confidentiality will be safeguarded during and after the study. Interviews will be digitally recorded on a password protected recording device, and as soon as possible transferred to secure LJMU servers and the recording deleted from the device. It will then be transcribed and the interview data will be anonymised and you will not be named in any of the written reports. No one else will see the interview transcript other than the researchers who are doing the study.

This study has received ethical approval from [ADD]

Contact Details of Researcher: [ADD]

If you any concerns regarding your involvement in this research, please discuss these with the researcher in the first instance. If you wish to make a complaint, please contact [ADD if appropriate] and your communication will be re-directed to an independent person as appropriate.

11.6. Example of interview consent form

Title of Project: *Evaluating the acceptability of a Performance and Image Enhancing Drugs e-learning module among health care providers*

Name of Researcher and School/Faculty*: [ADD]*

1. I confirm that I have read and understand the information provided for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and that this will not affect my legal rights.

3. I understand that any personal information collected during the study will be anonymised and remain confidential.

4. I agree to take part in the interview.

5. I understand that the interview will be recorded and I am happy to proceed.

6. I understand that parts of our conversation may be used verbatim in future publications or presentations but that such quotes will be anonymised.

| Name of Participant | Date | Signature |

| Name of Researcher | Date | Signature |