Fitness professionals' perceptions of acceptability and usability of anti-doping education tools for recreational sports.

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Abstract

Objective: Use of performance and image enhancement drugs (PIEDs) in recreational sport is a common practice and there is a need to develop preventive interventions. The study's aim was to investigate the acceptability and usability of an online e-learning course and an information app designed to support PIED prevention training activities in professionals working with recreational athletes.

Design: A mixed-method design was used with 51 professionals from Finland, Greece, and Lithuania evaluating the e-learning course through surveys and interviews. Similarly, 19 Greek professionals evaluated the app.

Main Outcome Measures: Participants completed surveys and participated in semi-structured interviews measuring both tools acceptability, usability and implementation.

Results: Participants commented positively on the value and content of both tools. They reported increased knowledge on PIEDs risks and understanding of motives for PIED use. Also, their competence and confidence in interacting with clients and assisting them to quit increased. The e-learning course was perceived as compatible with existing practices. The main barrier was lack of time in interacting with clients.

Conclusion: The study provides valuable information on the acceptability and usability of two educational approaches against doping. Anti-doping educational authorities could integrate these tools into their activities to educate fitness instructors about doping.

Key words: performance enhancement, doping, recreational sports, fitness, e-learning, mobile app

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The use of performance and image enhancing drugs (PIEDs) in professional sports has received much academic and policy attention (Bates et al., 2019; McVeigh & Begley, 2016; Pope et al., 2014). However, PIEDs are also used by amateur athletes, recreational sports and fitness enthusiasts (Lazuras et al., 2017). Fitness Against Doping (European Health and Fitness Association, 2012) reported a prevalence of doping use in recreational sports across Europe of 2.5%. On the other hand, research evidence suggested higher prevalence rates. For instance, Stubbe et al. (2014) reported that 8.2% of teenagers and young adults attending Dutch fitness centres have used PIED in the past year. In this line, data from five European countries targeting young exercisers aged between 18 to 25 involved in fitness, bodybuilding, cross-fit and other strength-related fitness activities estimated a lifetime prevalence close to 20% (Lazuras et al., 2017). This evidence suggests that the use of performance enhancement substances in recreational sport is a common practice for young exercisers and efforts to tackle this behavior should be developed.

So far, little has been implemented to address the use of PIEDs among those involved in amateur and recreational sport (Barkoukis, 2015; Tsorbatzoudis, Lazuras & Barkoukis, 2015). However, a number of prevention (i.e., deter people from use) and harm reduction (i.e., minimise the risks from use) initiatives have been recently developed targeting PIED use. These include interventions delivered on multi-media platforms, and through the use of elearning tools. Examples include the Safe You programme (www.safeyou.eu), Dopinglinkki e-learning tool (dopinglinkki.fi/koulutus/verkkokoulutukset), Eigen Kracht (www.eigenkracht.nl) and 100% Ren Hardtraning (www.renhardtraning.com). These interventions focus on the health side effects of doping use and on the psychosocial determinants of doping

use (e.g., Safe You programme). A recent systematic review (Bates et al., 2019) examined the effectiveness of interventions (N=14) aimed at preventing the use of PIEDs. 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. To date there is only scarce evidence on the implementation of interventions targeting PIED use in recreational sport and their usability and acceptance by fitness professionals and exercisers. To address this gap the present study focuses on two such educational tools; Dopinglinkki e-learning course and *Safe You* information app.

In Finland, Dopinglinkki developed an e-learning course on PIED use in recreational sports. The course intended to increase fitness professionals' awareness of the characteristics and possible needs for fitness exercisers and improve their professional skills when people use or are at risk of using PIEDs. The e-learning course includes presentation of research and anecdotal evidence about the effects of doping use, videos and animations. The course comprises 9 units, 5 of which include information on PIED use. This includes scientifically based information on doping substances and their adverse effects, nutritional supplements, exercisers' behaviours denoting doping use, factors leading to use, individual's motivations for use and helps fitness instructors encourage cessation without moralising doping use (e.g. through empathy and informed discussion about the motivations for PIED use). The other 4 units consisted of a test with questions on what the participants had learnt, their feedback, the certificate and the link to the questionnaire.

The Safe You information app was created by the Safe You consortium in 2018, as part of the Safe You project (http:/safeyou.eu) and is in the format of a searchable compendium that contains information on pharmaceuticals used in doping.

It is an educational learning tool which aims to provide basic information on PIED categories and substances that people are most likely to use in the fitness sector and gyms. It consists of four main substance categories: a) muscle growth and strength (e.g., stanozolole); b) weight loss and fat burners (e.g., clenbuterol); c) endurance (e.g., EPO); and d) side effect modulators (e.g., clomiphene). Each category contains a list of substances, and for every substance the app offers information on its pharmacology, the short- and long-term impacts on health, and World Anti-Doping Agency (WADA) status (i.e. whether the substance is prohibited or not for competitive athletes). Furthermore, information on the dosage recommended for medical use, and the most common side effects are provided.

The present study

To date, there is only limited formal evaluation of the preventive and harm reduction interventions developed for PIED use in recreational sport (Barkoukis, 2015; Bates et al., 2019; Tsorbatzoudis et al., 2015). In addition, evidence from competitive sports demonstrates that coaches lack knowledge about doping, and they don't see anti-doping education as part of their responsibilities (Barkoukis et al., 2019). Furthermore, a systematic review showed that coaches had less knowledge of specific banned substances and their associated side effects and their lack of self-efficacy to work with players on doping related issues was due to their poor knowledge and understanding (Barnes wt al., 2020). Accordingly, many coaches perceive themselves as only having 'a little' knowledge about anti-doping and declared themselves as 'a little' equipped to work with their sportspeople on doping-related matters. (Patterson et al., 2019). Still, such evidence in the fitness industry is scarce. The present study set out to address these gaps and evaluate the acceptability usability, and utility of two e-learning tools, the Dopinglinkki e-learning course and the Safe You information

app. Professionals working in the fitness sector such as gym owners, fitness instructors, personal trainers and coaches are the ones that get in touch with the gym clients and can consult them about PIEDs use and help them make an informed decision. Barkoukis et al. (2019) indicated that coaches avoid doing so because of the doping stigma and their limited knowledge and suggested that education would enable them undertake a more active role against doping. Toward this end, educational tools should provide appropriate knowledge about PIEDs use, be suitable for these professionals, be user-friendly, easy to navigate and use, and increase willingness to consult clients.

We utilised the Normalisation Process Theory (NPT) (Murray, 2010) and the Theoretical Framework of Acceptability (TFA) (Sekhon et al., 2017) as the focal conceptual frameworks guiding our study. The NPT describes the key mechanisms of how to embed an intervention in practice; *coherence* reflecting the sense-making work that people do in order to operationalise a new practice; *cognitive participation* representing the work that people do to build and sustain practice around a new practice; *collective action* describing the operational work that people do to enact a set of practices; and *reflexive monitoring* reflecting the appraisals people do to assess and understand the influence of the new practice. These mechanisms were used to help understand the processes and the effort required to develop PIED-related skills. The TFA complements the NPT mechanisms and provides a guide indicating whether practitioners consider a health-related intervention to be appropriate to their professional practice (Sekhon et al., 2017). Based on these, the specific objectives of the study were to investigate a) to what extent professionals engage with the tools within their practice, and whether they would be willing to do so in their future practice; b) whether the tools will increase the professionals knowledge about anti-

doping how; c) whether the tools are usable; d) whether the tools will increase the professionals competencies to consult their clients; and e) whether the tools were user-friendly and easy to use. The study 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.

Method

Evaluation of the tools

Participants

Quantitative evaluation: Data were collected in three countries (Finland, Greece, and Lithuania). For the evaluation of the e-learning course, data from 51 participants was included in the analysis (Finland = 17, 11 female; Greece = 20, 5 female; Lithuania = 14, 10 female). The twenty-five participants evaluating the e-learning course described themselves as fitness instructors, four as coaches, and the remaining were a mixture of gym owners, and health promotion workers in gyms (e.g., physiotherapists; Table 1). Their mean length of working experience was 10.2 years (± 7.6) and twenty-eight participants had at least an undergraduate degree (54.9%), with the rest reporting high school qualifications or equivalent.

For the evaluation of the information app, 19 participants from Greece (n=12 males) took part. Seven described themselves as coaches, 6 as personal trainers, 3 as group fitness instructors, and 2 as gym owners (Table 1). They had worked a mean of 7.26 years (± 3.1) in the fitness industry, and all had University degrees (11 Masters Level Degree; 8 Undergraduate). Although none had previously received specialist qualifications related to PIED use, two reported attending specialist seminars in the past. Eight (42.1%) participants believed there had been an increase in the number of adults using PIEDs, whilst four (21.1%) reported this for clients aged under 18s.

Qualitative evaluation: A total of 24 interviews were conducted with individuals who completed the e-learning course and 10 (in Greece) from those who navigated the app. The professional background of the individuals was similar across countries. Regarding the completion of the e-learning course in Finland (N=4), participants who took part were coaches (n=2), a trainer (n=1) and a health promoter (n=1). Two identified themselves as gym owners 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. Participants in Greece (N=10), included personal trainers (n=5), coaches who worked in gyms (n=4) and a gym owner (n=1). One trainer also reported being a dietician, and another a physiotherapist. 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 Lithuanian National Anti-Doping Organization (NADO) platform, most reported no prior knowledge or self-directed learning.

Participants who navigated to the app were interviewed and included those working in a gym setting (n=4), personal trainers and/or coaches (n=5) and a gym owner (n=1). One also reported being a dietician. The same procedure used in the qualitative evaluation of the course was used for the evaluation of the app as well.

Survey

The content of the survey was informed by previous research (e.g. Begley and McVeigh, 2017), the study research aims and objectives, and included items based on the Theoretical Framework of Acceptability (TFA) (Sekhon et al., 2017). The TFA was developed to support assessment of intervention acceptability. The survey

included questions about participants (e.g. demographics, their role, experience) and their clients (i.e. nature of PIED using client); current PIED practice (e.g. current and desired responses to PIED use, previous relevant training); and their current sources of PIED information. There was also a section to assess participants' awareness of the various adverse health effects of PIED use, and which they had encountered amongst their clients. Additionally, there was a section of PIEDs and society aiming to gain insight into their general views on PIED use, the participants' values regarding PIED use and perceptions of acceptability of use and legal status. The survey also had questions regarding their experience of using the PIED e-learning course, obtaining information via internet and self-assessment of learning goals based on each tool core learning goals. The same survey, adjusted to the content of an app was used to evaluate participants' opinions about using the app.

Interviews

The interview included questions assessing participants' current practice (e.g., current role, experience working with people who use PIEDs, participants' main source of information and previous training on PIEDS, previous use of e-learning generally, how the tool differed from other learning approaches). Questions regarding the completion of the course were also included; if they had completed it or not, the amount of time completing it and their expectations of the course. E-learning course content and impact were assessed with questions such as whether the content was clear and easy to understand, appropriate and useful for their professional role, the content they felt was missing, what benefits would arise and to whom, how the course would benefit themselves and whether it filled any gaps in knowledge. Regarding future implementation participants were asked whether their senior management would support its use, what barriers may prevent the e-learning course being

implemented and used in their profession, what changes (e.g., individual, organisational, or to the e-learning course itself) they felt were needed to facilitate the effective future implementation of the course in their workplace and whether they felt that its use could become a routine practice in their profession. The same interview matrix adjusted to the content of an app was used to evaluate participants' opinions about using the app. The same data analytic procedures followed in the evaluation of the course were employed in the evaluation of the app.

Procedure

Ethics approval was obtained from Ethics Committee of the Aristotle University of Thessaloniki. The survey was translated and adapted to the three countries (Finland, Greece, and Lithuania). All participants were identified through personal and professional networks. A written consent form, a study information sheet, the link to the e-learning course/app and information on the registration, was sent to participants via email. In the last section of the course, there was a link leading to the online questionnaire to encourage participation in the evaluation. An email providing participants the link to the online questionnaire was sent following completion of the course to boost the response rate. The survey was anonymous, and participants were able to withdraw any time they wished so without any implications. Participants were also informed that their responses would be treated confidentially and used for research purposes solely. The online survey completion lasted between 10 and 20 minutes.

All survey participants were invited to take part in an interview. Contact was initially made with those expressing interest of being interviewed within the survey. An email invitation was also sent as a reminder, asking for their participation in the interview. All participants were provided with a study information sheet and provided a written

consent form. Twelve interviews were conducted face to face, 21 via telephone and 1 via Skype, and were recorded and transcribed. Interviews were conducted at the place and time of the participants' convenience. Each interview lasted between 15 and 30 minutes.

Data analysis

Statistical analyses were performed with SPSS 26. Descriptive statistics were used to identify the mean scores of the tested variables; ANOVA was used to test for differences across the countries. In our analysis we included ethical considerations, affective attitudes, workload, perceived effectiveness, self-efficacy, and intervention coherence (see Authors, in press).

Interviews were coded incorporating a combination of pre-determined and identified themes using a thematic analysis approach developed following data familiarization in NVivo 10 (Braun & Clarke, 2006, 2020). The Braun and Clarke's (2006) steps were followed including closely reading the transcribed interviews and systematically applying the coding frame and generating additional codes, which were then collated into themes that worked across the transcripts. Analysis was summarized including Microsoft Excel and guided by a pre-designated thematic analysis framework based on NPT and TFA. A co-author from each participating country undertook the thematic analysis (Braun & Clarke, 2006, 2020) of their interview data and submitted the data to one of the authors for synthesis. 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.

Results

Quantitative evaluation of the e-learning course

Preliminary analyses: Seven participants (13.7%) had previously worked with people using PIEDs, and 7 (13.7%) did so currently. Participants who knew of, or suspected PIED use, estimated they had worked with approximately 3.9 (± 5.2) people who used PIEDs in the previous 12 months. Actual or suspected PIED users 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 participants (45.1%) had observed an increase in the number of adults using PIEDs, whilst 10 (19.6%) reported this for clients aged under 18. Thirty participants (76.5%) reported they would encourage clients to cease PIED use if this had been identified; 5 (9.8%) would not, 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. Considering their own role in supporting clients around different health topics, participants were asked to rate how much they believed their clients trusted their knowledge and the advice they provided (answered on a 1-10 scale with 10 = highest level of trust). Regarding the levels of trust mean score for fitness in general was 8.4 (± 1.7), for weightlifting and body building 7.9 (± 2.3), for PIEDs information 7.2 (± 2.4), for health and disease in general 7.2 (± 1.8), for alcohol 6.2 (± 2.4) and for illicit drugs 5.9 (± 2.7).

Usability of the e-learning course: Forty-one (80.4%) participants reported they had completed the course, whilst 7 (13.4%) began it, but didn't finish due to lack of time. Three people (5.9%) reported they did not use the course at all. Twenty-six (51.0 %) completed it in their free time, whilst nine (17.6%) in work time and six (11.8%) used both their free and work time. Time spent using the course ranged from 10 minutes to

6 hours. A majority, 48 (94.1%) participants, believed they had sufficient background knowledge to complete it.

Answers to the course's utilisation questions are summarised in Table 2. Overall, there was agreement across four domains that the course 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 their organisation. There were no notable differences between countries, although two participants in Greece reported that the course was too long and contained too much information.

Qualitative evaluation of the e-learning course

Module description: There was coherence in how participants from different countries described the e-learning course, with all finding it easy to describe. As shown in the extracts below, it was regarded as a '*basic*' course that used '*simple and understandable language'* and provided '*clear'* content '*easy to understand'* (*Trainer 2, Lithuania*). Participants mentioned it provided a useful resource on all aspects of PIED use (e.g. *'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*) although it was targeted at those working with (adult) amateur athletes, it was felt to be applicable to 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 (e.g. *'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 to know.'-Coach 1, Finland*), help them identify those using, allow them pass on information to those using and enhance their professional competences when interacting with clients who use PIEDs (e.g. *'I will feel more comfortable to discuss about PIED harm with my clients.'-*

Trainer 2, Lithuania). Such coherence and clarity suggest that the course was accepted and understood by all participants.

Expectations: There was also coherence in how participants described their expectations of the course. Most had expected it to provide an overview of '*the basics'* of PIED use and reported that this expectation was met. However, some with prior PIED knowledge had hoped for more '*detailed*' content and a more '*extensive course' (e.g. '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).* For example, a more detailed overview of the prevalence of PIED use, more information on food and nutritional supplements and their interactions, more information specifically outlining how to '*recognize a user'* and information on long-term effects. Some participants had been initially sceptical about the value (e.g. *'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*) and orientation of the course prior to taking part and had expected the tone to be more judgemental of use (e.g. emphasising an abstentionist position). They were therefore pleased that it provided a more balanced overview of PIED use. For some it provided new knowledge, and for others, reassurance of their existing knowledge (e.g. 'It renewed my existed knowledge on supplements, because in my bachelor studies I had done my thesis on supplementation'-*Personal trainer/coach 2, Greece*).

Innovation: Participants across countries had little prior training and self-directed learning on PIED use. Previous examples of resources consulted included the Dopinglinkki website, Lithuanian NADO platform, articles, seminars, internet

websites, forums and magazines (e.g. '*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*). In Lithuania the course was discussed as the first resource available in Lithuanian language. As such, the e-learning course provided a pioneering resource that is distinct from other educational tools (*Personal trainer/coach 2, Greece*). The tool was regarded as unique because it was online, interactive, and free to access (e.g. '*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*). It was regarded as a credible resource (with the expert videos adding to the feel of credibility), that would complement others. It would form '*the basis'* of self-learning (*Trainer/pharmacist and health promoter, Finland*), but other resources would be consulted to gain a deeper understanding.

'Perceived effectiveness and compatibility: As exemplified by participants, there was consensus that the main effect and advantage of completing the course was increasing knowledge. A number of gaps in existing knowledge were discussed as being addressed by completing the course, including information on the range of substances used, effects, harms, motives for use, identifying people who use and prevalence of use (e.g. *'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'-Health promoter, Finland*). As a result, some reported feeling more confident when interacting with clients and are now motivated to learn more about PIEDs (e.g.*'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 e-learning course in helping them identify clients who used PIEDs and they were now able to pass on '*reliable information'* (*Psychotherapist, Finland*)to clients to assist them in making more '*informed decisions'* regarding use. The course was discussed as being useful for the purposes of both prevention and harm reduction (e.g. *It can be used by trainers for prevention and to inform users about the harm'-Personal trainer/coach 1, Greece*) and was regarded as being beneficial to other professionals such as dieticians, psychologists, teachers, nurses, doctors, pharmacists and physiotherapists.

Most reported they felt that the course was appropriate for their profession and had a responsibility to inform and communicate with clients about PIED use and related harm. It was suggested that those working in the industry who held a trusted position were ideally placed to '*affect his/her perception and thoughts'* on PIED use (e.g. *'It will make them think twice before using'-Gym owner 2, Greece*). The course was found useful to those aiming to prevent use, 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*).

Moreover, some participants were unsure as to whether applying the knowledge gained from the course to discussions with clients, would actually prevent use (e.g. *'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*). It was suggested that the 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. On the other hand, participants reported that it may not be effective with already users as it will be rather difficult to persuade them change their decision (*Psychotherapist, Lithuania*). However, the course appeared to fit with participants' values 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 it would be accepted and promoted by their employers (e.g. gyms), some noted that they thought PIEDs was actually promoted within some gyms and by some in the fitness industry professionals, it would not be taken up and promoted.

Required effort, user commitment and self-efficacy: Overall, participants felt that the course was 'valuable' and '*a good idea'* (*Personal trainer/coach 2,* Greece). A small number had a difficulty in finding time to complete it, suggesting a high degree of user commitment to using the course. Other than having time aside, most felt that completing the course involved minimal effort (e.g. *'Minimal effort [was involved]. I had to do it in my own time. It was very easy to use the system.'-Coach, Finland*). All reported they had the technical skills required to complete it and 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 e-learning course by a mobile phone'* (*Personal trainer/coach 1, Greece*). The content was regarded as clear and easy to understand, and only one reported feeling that it was difficult to understand in parts. This suggested a high degree of self-efficacy among participants.

Barriers and future implementation: Many participants believed that there were no barriers to future acceptance and use of the course within their profession (e.g. 'I don't

think that there are any barriers because the e-learning course is so easy to use, it's very low threshold, doesn't get any easier than this'-*Coach 1, Finland*). They reported their intention to use it in the future and most felt it could become routine practice in their profession. Those that were unsure whether the course would become routine practice questioned their own role in intervening and preventing PIED use among clients. As they suggested, this is a sensitive issues and people with expertise would be more appropriate to discuss about it. When barriers to future use were reported, they were at the individual and organisational levels. This included a lack of awareness among individuals that the course was relevant to their work (e.g. *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*), and a lack of time to complete it. It was noted that for the course to be effectively used, it would require willingness and effort to encourage and endorse the course at the organisational level. It was therefore suggested that the usefulness of the course should be highlighted to individuals and employees, should be better advertised, and that ideally dedicated time in working hours would be provided by employees for staff to complete it. Some requested additional content (e.g. food and nutritional supplements), an app or mobile accessible version, and some felt that the log in process should be simplified.

Evaluation *of the Safe You Information app*

Quantitative evaluation

Preliminary analyses: Seven participants from Greece who evaluated the information app reported that they 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. Considering their role in supporting clients around

different health areas, participants were asked to rate how much they believed their clients trusted their knowledge and their advice. Mean score for PIEDs (1-10, where 10 =greatest trust) was 6.3 (± 2.1). For other topics scores were, fitness in general 7.7 (± 2.1); weightlifting and body building 6.9 (± 2.4); health and disease in general 6.7 (± 2.4), alcohol 5.8 ± 2.3 and illicit drugs 5.6 (± 2.3).

Evaluation of the Information App: Sixteen (84.2%) participants reported they navigated the majority of the app content, whilst the remaining 3 (15.8%) a small part of its content. Seventeen completed it in their free time, whilst 2 (10.5%) used both their free and work time. Time spent using the app ranged from 10 minutes to one-week, with 10 participants (52.6%) spending between 10-30 minutes. No participants reported that navigating the app took *too long*.

Answers to app utilisation questions are summarised in Table 2. Overall, there was agreement across four usability domains that the app was easy to access and use; it would improve their professional competences; was easy to understand the content and enjoyable and interesting to use. There was ambivalence about whether 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 most participants testing the app in their free time. Only two participants thought they did not have the appropriate knowledge to use the app and had not previously sought information or training on PIEDs.

Qualitative evaluation

Module description: 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 '*clear*' and '*easy*' way 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*' (e.g. *'It provided a lot of information gathered at the same place and I found it very interesting' -Personal trainer/coach 6, 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 the app fitted 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 reducing the likelihood of such harms being experienced.

Expectations: Whilst not all had clear expectations of what the benefits of using the app would entail, all reported positive experiences. For some it provided new knowledge *(e.g. feeling 'more informed'*), and for others, reassurance of their existing knowledge. Some reported that their expectations had been exceeded in that the information was more detailed than they had envisaged (e.g. *'It was better than expected. I expected it to be simpler, with less information, less substances but it was well informed.' -Gym instructor 4, Greece*). Other than one individual who believed that 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.

Innovation: Some participants had no prior knowledge on PIEDs and had not engaged in other learning resources, so the app provided a new and distinct source of learning. For those that had engaged in prior learning, the content was not felt to

differ, but the platform through which it was presented was regarded distinctive and beneficial. An app-based resource such as this was reported as providing a useful, simple and accessible format in which to engage with a range of information. It was felt to be unique in that it pulled together information on PIEDs into one source; that could be easily accessed at the participants' convenience *(e.g. 'I saw information I had heard in other seminars, but they were all together in a simple way and you could find what you were looking for easily'-Gym owner 4, 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 of '*reinforce[ing] [their] knowledge because of the immediate access'* to a range of information when it was required. Others suggested that it provided the basics so it could be used alongside with other sources.

Perceived effectiveness and compatibility: The effect of using the app on participants' knowledge and professional practice was not assessed, but we did explore the self-reported and anticipated effectiveness. All participants felt that using 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 and harm reduction, most felt that clients would benefit from 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'*. Most perceived the provision of information as adequate in encouraging behaviour change and in preventing use *(e.g. '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 6, Greece).

There was consensus across participants that the main effect and advantage of using the app was to increase knowledge. The benefit from the app was gaining information about several substances and the consequences of use. 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 (e.g. *'I would approach them discretely and ask them. Till now I couldn't intervene because I didn't have the knowledge'-Gym instructor 5, Greece).* Participant's felt that the app had the potential for wider usage and discussed it as being useful to the wider fitness, medical, health and education sectors. It was felt to be useful to dieticians, doctors, physiotherapists, psychologists, pharmacists, and schools.

Required effort, user commitment and self-efficacy: 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 it in their own time and had not yet used it during their day-to-day professional practice. Most felt it would be useful in their future practice and all discussed how they would recommend it to their colleagues, (some had already done so). 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 work place 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 '*something to gain'* from its use (e.g. *'Some gyms working with body builders would use it for extra development, while at a*

club with young athletes this could be used for prevention'-Personal trainer/coach 6, Greece). It was also suggested that different professions had different purposes for using the app, and that some gyms may endorse the app in a way that may encourage use. Its use was regarded as involving minimal additional effort ('*some time*') and other than one individual who felt he/she didn't had the time to use it in future, all reported they would be prepared to invest time, energy and work in using it. However, lack of time was reported as the main barrier to future use.

Barriers and future implementation: Few barriers to future implementation and effective use of the app were discussed, suggesting a general acceptance of the app within the fitness profession. At the individual level, it was suggested that use would be dependent on the individual's motivation and an awareness of its usefulness and relevance to their work. Few changes where suggested; 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. *'To have immediate access and use the app like our watch; whenever needed'-Gym instructor 5, Greece*) would be beneficial. One individual suggested that references for further reading should be included to direct people who use to additional resources to further enhance their knowledge.

To facilitate the effective implementation of the app 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 previously, time was the main barrier to future use, as they suggested that they need more time to interact and discuss use, to share and apply the knowledge learned with clients (e.g. *'Time. Clients need fast and short information's to be*

convinced. In order to convince them you need more time'-Gym instructor/coach 4, Greece).

Discussion

The present study was designed to evaluate the acceptability and usability of an online e-learning course and an information app that were designed to support anti-PIED use learning in professionals working with recreational athletes. Our findings demonstrate that both the e-learning tool and the information app were useful in providing anti-doping education and can be used by those working in the fitness industry. More specifically, both tools increased participants' knowledge of PIEDs and engagement with the tools was high. These findings suggest that mobile learning/training apps were evaluated as appropriate means of anti-doping education in the fitness sector. This corroborates Çelik's (2020) suggestion that e-learning can assist in educating sportspeople on important sport-related issues, such as anti-doping, and is an essential avenue for future education efforts.

Our findings showed that through the online course and information app study's participants managed to either be informed or use it as a reminder of the existing knowledge anytime needed. Findings from both the survey and interviews revealed that both tools were regarded as clear and easy to use and understand, and that participants felt they were distinct from other PIED resources they were aware of. Results from the quantitative evaluation indicated that participants felt using the online course would help them achieve its intended learning outcomes. This implies that, after gaining the knowledge needed, the study participants could identify those using PIEDs and be ready to approach them with awareness and confidence, discuss about PIEDs, inform them and answer their questions with facts and researches and guide them to make the proper and informed decision. Therefore, both tools were

helpful in providing fitness professionals with the appropriate knowledge and made them feel more responsible about their role in informing their clients about doping. This evidence supports Barkoukis et al. (2019) contention that education would assist professionals be better equipped to implement anti-doping education. Both tools were found appropriate in persuading fitness professionals overcome the stigma of discussing about doping and in being more willing to interact with their clients and help them make more informed choices about PIED use. This evidence provides an important implication for practice. It is apparent that people working in the fitness industry avoid talking about doping due to lack of knowledge. Thus, utilizing such tools is expected to increase their confidence in dealing with doping with their clients.

With respect to the barriers to using the tools, lack of time seemed to be the major inhibitor. However, the online nature of the tools, and the short time needed to navigate the app, were significant factors helping them engage with the tools and be better informed about doping. This was highlighted by participants who stated that the tools were considered as 'unique' because they were online and free to access. These findings suggest that both tools may have benefits over other types of education as they can be used either due to the professionals' free time (e.g., e-learning course) or during their working time (e.g., SafeYou information app). Abu-Shanab and Musleh (2018) noted that online education may be extremely useful for busy, disadvantaged or geographically isolated people. Taking into consideration that time emerged as a restrictive factor in learning about doping in the present study and the tools didn't lack the appropriate breadth of information, it seems that the e-learning course and app can be useful tools for fitness professionals in being educated and influencing their clients about doping. Thus, such types of online education should be fostered by fitness and educational authorities and incorporated in VET programs. Accordingly,

university curricula should include such type of education in order to better prepare the future fitness professionals.

Participants rated the online course as interactive and acknowledged as benefit that it was translated in their native language. On the other hand, the information app was suggested as a more useful and practical form, easily accessible in their day-to-day work. This made the app more appealing for use during their working hours, as the online course would require organizational approval and support to use with their clients. Thus, it seems that a combination of online education accompanied from an information app would be more suitable for fitness professionals. These finding are in line with Mehdipour and Zerehkafi (2013), and Chea (2016) and Abu-Shanab and Musleh (2018) who supported the use of mobile phones and online courses respectively for educational purposes. This is especially important for people who can't devote a lot of time in being educated about collateral to their main practice topics, such as doping (Abu-Shanab and Musleh, 2018).

Limitations and reflections

Whilst the current research was an important first step, future work should investigate whether such tools can change doping-related beliefs and behaviour, as there is a notable lack of research on the effectiveness of PIED interventions. In this line, this study was not designed to evaluate the effectiveness of the tools in improving specified learning outcomes, the practice of users, or the health of people who use PIEDs. Rather it examined whether fitness professionals found it useful and acceptable. Although participants reported positive views about the tools, we have no evidence on whether they actually helped them change their interactions with their clients. Future studies should more thorough investigate the effect of anti-doping

interventions in changing behaviour. Furthermore, a focus on online education should be made. Although there is a growing number of mobile learning/training apps and online anti-doping resources (Barkoukis et al., 2019; Ziagkas et al., 2020), few of these have been appropriately evaluated, 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 types of evaluations (McKay et al., 2018). Lastly, we should note that the sample of the study in the quantitative evaluation of the tools is rather small and it may not be representative of the fitness industry. Although we tried to recruit people with different roles in the fitness industry, our findings should be interpreted with caution and possibly can't generalise to the whole fitness industry. Future studies would benefit from larger samples. Notwithstanding the limitations of the present study, we employed a mixed method design that provides opportunities to researchers for obtaining more rich information that can be effectively used in educational settings (Almalki, 2016). Our findings demonstrate that online courses and information apps were perceived as acceptable and useful by fitness professionals. Therefore, fitness professionals would benefit from using these online tools. Being educated about doping (e.g., through the e-learning course) and having a user-friendly software (e.g., the SafeYou information app) to consult in their everyday work is expected to enhance their interactions with their clients and help them make more informed decision about doping. This evidence provides a basis for future anti-doping efforts and indicates that anti-doping education should move forward and integrate new technologies.

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Table 1.

	Finland	Greece	Lithuania	Greece/app
Personal trainer	*5*	*8*	*4*	*6*
Fitness instructor	*3*	*1*	*6*	*4*
Gym owner	*2*	*4*	*1*	*2*
Coach		*4*		*7*
Physical therapist	*1*	*2*		
Health promotion – including health and wellness coach/nutrition/instructor	*2*	*1*	*3*	
Sport and health sciences students	*4*			

Table 2

Experiences of Using the App

	Mean ± SD	Range
Performance expectancy		
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
The App would be useful to me in performing my job	3.2 ± 1.0	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 interesting to use	4.1 ± 0.7	3-5
I found the App enjoyable to use	4.0 ± 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
In general, my organisation would support use of the App	3.1 ± 1.1	1-5
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
Facilitating conditions		
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
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
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 months	3.0 ± 1.1	1-5
Additional questions		
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 would recommend the App to a colleague	4.0 ± 0.9	1-5
Using the App will enhance current approaches to PIED use within my profession	3.6 ± 1.1	1-5
I think the App provides too much information	3.4 ± 1.2	1-5
I would be prepared to invest time, energy and work in using the App in future	3.4 ± 1.3	1-5
I think the information included in the App is too long	2.8 ± 1.0	3-5

Table 3

Experiences of Using the Module.

	Mean ± SD	**FI Mean ± SD**	**GR Mean ± SD**	**LT Mean ± SD**	**Difference among countries (p value)[1]**	**Post hoc differences[2]**
Performance expectancy						
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	-
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 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 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
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 interesting to use	4.4 ± 0.8	4.5 ± 0.7	4.1 ± 1.0	4.6 ± 0.8	0.186	-
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	-
Social influence						
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	-
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	-

Facilitating conditions						
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
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
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 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	-
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	-
Additional questions						
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 credible	4.4 ± 1.0	4.4 ± 1.2	4.3 ± 0.8	4.4 ± 0.8	0.912	-
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 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	-
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 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 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	-
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	-
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 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

Note: [1] * p < 0.05; ** p < 0.01; *** p < 0.001; [2] Bonferroni post hoc to correct for multiple comparisons; FI=Finland, GR=Greece, LT= Lithuania