Sheffield Hallam University

A Serious Game Approach in Anti-Doping Education: the Game Project

BARKOUKIS, Vasileios, TSIATSOS, Thrasyvoulos, POLITOPOULOS, Nikolaos, STYLIANIDIS, Panagiotis, ZIAGKAS, Efthymios, LAZURAS, Lambros and YPSILANTI, Antonia <http://orcid.org/0000-0003-1379-6215>

Published version

Copyright and re-use policy

A Serious Game Approach in Anti-Doping Education: the Game Project

Vasileios BARKOUKIS, Thrasyvoulos TSIATSOS, Nikolaos POLITOPOULOS,
Panagiotis STYLIANIDIS, Efthymios ZIAGKAS,
Aristotle University of Thessaloniki, Thessaloniki, Greece
bark@phed.auth.gr, tsiatsos@csd.auth.gr, npolitop@csd.auth.gr, pastylia@csd.auth.gr, eziagkas@phed.auth.gr

Lambros LAZURAS, Antonia YPSILANTI
Sheffield Hallam University, Sheffield, UK
L.Lazuras@shu.ac.uk, A.Ypsilanti@shu.ac.uk

Abstract: Doping is defined as the use of prohibited substances and methods to enhance or maintain sporting performance. Recent research evidence in social and behavioural sciences highlighted the underlying psychological mechanisms and processes that is associated with the decision making process towards doping, as well as as well as the factors that would act protectively to prevent doping. This evidence can be utilized to inform, design and evaluate tailored anti-doping educational interventions. Anti-doping education has largely relied on traditional educational approaches such as face-to-face interaction and e-learning material. Current challenges in anti-doping education involve a) the development of modern educational tools suitable for the new generation of athletes, b) the use of state-of-art learning pedagogies that will enable effective engagement, learning and retention of the learned material, c) a systematic evaluation of the outcomes of anti-doping educational interventions on behaviour and related cognition, and d) a positive approach to doping prevention. Project GAME aims to address these needs through the development of a serious game that will incorporate current empirical evidence on the psychological mechanisms underpinning the decision making process towards doping use in competitive and recreational sports. The aim of the present study is to highlight the importance of anti-doping education, conduct a state of the art literature review on serious games' design, present the prototype of a scenario that will be included in a serious game for anti-doping education, and discuss the project's activities related to the use of technologies in anti-doping education.

Keywords: Serious Games; Anti-doping; Sports; Performance Enhancement.

I. DOPING AND THE NEED FOR ANTI-DOPING EDUCATION

Doping is defined as the use of prohibited substances and methods to enhance or maintain sporting performance. Recent research evidence in social and behavioural sciences highlighted the underlying psychological mechanisms and processes that is associated with the decision making process towards doping, as well as as well as the factors that would act protectively to prevent doping. This evidence can be utilized to inform, design and evaluate tailored anti-doping educational interventions. The need to incorporate this empirical evidence from the social and behavioural sciences in concerted and systematic efforts to educate young athletes against doping use has been emphasized by scholars and researchers in anti-doping (Barkoukis, 2015; Tsorbatzoudis et al., 2015), as well as global leaders and stakeholders of sport, such as WADA, the International Olympics Committee (IOC). Researchers have also noticed that a lot of existing efforts in anti-doping education focus on the negative aspects of doping use (e.g., increasing health concerns), while neglecting a "positive" approach to anti-doping education, such as promoting a "clean sport" identity and culture, and empowering athletes to make informed decisions against doping use in amateur, grassroots and elite sports (Enlgar-Carlson et al., 2016). So far, however, there have been limited efforts to develop and evaluate the effectiveness of

evidence-based anti-doping education efforts. A recent study showed that a theory-driven and evidenced-based intervention strengthened anti-doping attitudes in adolescents with varying experiences and engagement in sports, and promoted the spirit and values of sport (Barkoukis et al., 2016). Another study showed that a school-based media literacy intervention against doping use bolstered more negative attitudes towards doping and reduced use of legal performance enhancement substances (i.e., nutritional supplements) among Italian adolescents (Lucidi et al., 2018). However, although they are based on state-of-art research designs, methods and evidence, those interventions targeted young people who do not necessarily engage in sports. More concerted educational interventions that target athletes are needed.

The aim of the present study is to highlight the importance of anti-doping education, conduct a state of the art literature review on serious games' design, present the prototype of a scenario that will be included in a serious game for anti-doping education, and discuss the project's activities related to the use of technologies in anti-doping education.

II.   CURRENT CHALLENGES IN ANTI-DOPING EDUCATION

Current challenges in anti-doping education involve the development of modern educational tools suitable for the new generation of athletes, the use of state-of-art learning pedagogies that will enable effective engagement, learning and retention of the learned material, a systematic evaluation of the outcomes of anti-doping educational interventions on behaviour and related cognition and a positive approach to doping prevention. Project GAME aims to address these needs through the development of a serious game that will incorporate current empirical evidence on the psychological mechanisms underpinning the decision making process towards doping in competitive and recreational sports.

Anti-doping education is currently at an early stage and there are several needs that must be addressed with respect to the design, implementation, and evaluation of anti-doping education programmes. Firstly, anti-doping education should be based on state-of-art learning pedagogies that will enable effective engagement, learning and retention of the learned material. Existing anti-doping interventions (e.g., Barkoukis et al., 2016; Lucidi et al., 2018) are allegedly educational but have not been developed on the basis of learning pedagogies - rather, they have adopted a traditional, lecture-like, one-way communication approach, where the "learner" has little to do with the learning process, and is simply expected to independently interact with the learning material and accordingly change his/her mindset and behaviour towards doping use. Learning pedagogies, such as problem-based learning (PBL), enable the learners to actively engage with the learning content (e.g., anti-doping education), set their own learning objectives, and accordingly engage in self-directed and independent learning (Wood, 2003). This approach enables learners to more effectively acquire and reflect on their knowledge, and use this knowledge to resolve problems in real-life situations (Savery, 2015).

Secondly, anti-doping education is concerned with changing intentions and behaviours towards doping by reducing the risk factors and promoting the protective factors against doping. Therefore, a system needs to be in place to assess how effectively anti-doping educational interventions fulfil their goals with respect to the different aspects of behaviour change. In the behavioural and health sciences, effective behaviour change is indicated by changes in three main aspects: beliefs about the behaviour (e.g., perceived health risks of doping use), intentions to change the behaviour (e.g., intentions to avoid doping use; intentions to become or remain "clean" from PAES use), and actual behaviour change (e.g., changes in doping related-behaviours, such as abuse/misuse of nutritional supplements or other ergogenic drugs that are not prohibited from WADA; long-term avoidance of doping; and reductions/abstinence from doping use among former users) - the effectiveness of interventions can, therefore, be evaluated against these three criteria (Epton et al., 2015). Nevertheless, currently there is a lack of such a systematic approach for evaluating the behaviour change outcomes of anti-doping educational interventions.

Thirdly, with the exception of WADA's ALPHA (which is the only known contemporary anti-doping educational resource that explicitly promotes clean sports mentality), there are no other known anti-doping educational interventions that promote a positive approach to doping prevention, such as developing a drug-free performance enhancement culture, and a "clean sport" identity (Enlgar-Carlson et al., 2016). In addition, ALPHA targets primarily a narrow group of elite athletes who will

independently seek to find information mostly about doping control procedures in WADA's website - this does not represent the bigger population of athletes in grassroots and amateur sports who are at risk for doping use but currently lack educational provisions and resources to avoid doping. Finally, anti-doping educational interventions should incorporate the learning process in the context of new learning technologies that can also facilitate behaviour change outcomes.

Serious Games (SGs) represent an innovative technological approach that aims to educate, train, and inform users (Michael & Chen, 2005), and have been widely and successfully used over the last 10 years to change attitudes and behaviour in the field of health, education and training (Connolly et al., 2012). SGs can be designed to support decision-making by realistically simulating real-life and risk-conducive situations and conditions (e.g., depicting situations where an athlete is experiencing pressure to dope), and train users how optimize their decisions. The existing evidence has shown that SGs are significantly more effective than conventional instruction method in terms of influencing learning and retention of the new material (Wouters et al., 2013), and in promoting health behaviour change (Baranowski et al., 2008; Göbel et al., 2010; DeSmet et al., 2014). Furthermore, persuasion and health behaviour change can be achieved more effectively when SGs are supplemented by evidence from the behavioural sciences about the behaviour in question (i.e., What leads to the behaviour? How can the behaviour be prevented? Baranowski et al., 2011; Connolly et al., 2012). Serious games have been increasingly embedded in diverse areas of health behaviour change ranging from diabetes monitoring (Makhlyseva et al., 2016), to helping people manage chronic health conditions (Charlier et al., 2016) and promoting physical activity and exercise (Huang et al., 2017).

Most importantly, given the widespread use of new technologies by young people, SGs offer an ideal channel to effectively reach out to young people and communicate information and train them about the dangers of doping use, as well as ways to effectively avoid doping (Baranowski et al., 2008). Nevertheless, despite the potential applicability and impact of SG applications in doping prevention, there has not been an SG specifically targeting doping in (elite and recreational) sports as yet, thus, leaving a very important gap in the development of effective, timely and impactful anti-doping educational interventions.

Project GAME, funded by Erasmus+ call on Sport, addresses the need to advance anti-doping education intervention targeting competitive and recreational athletes. Recently, several anti-doping educational campaigns have been developed to tackle doping in competitive and recreational sports. Project GAME recognizes the need to move forwards and transform the way anti-doping education is designed, delivered and evaluated. In this respect, Project GAME aims to utilize updated research from the social and behavioural sciences on doping use, state-of-art learning pedagogies and cutting-edge serious gaming design and technology in order to deliver an innovative and impactful anti-doping educational intervention. Project GAME contributes to the fight against doping by providing a serious game that is expected to reach wider audiences than typical anti-doping education campaigns. It will also utilise an innovative educational approach in teaching adolescents and young athletes. Finally, it will produce a report on evidence-based policy recommendations in order to improve existing policies against doping in amateur sport.

III.   A SERIOUS GAME EDUCATING ABOUT DOPING

The first step in developing a serious game educating about doping is to evaluate the existing e-learning platforms and choose the most appropriate for the anti-doping game. Towards this end an evaluation table was created and importance points were assigned to features that are needed for an effective platform. Scores ranged from 1 to 3, 1 indicating slight importance, 2 importance and 3 high importance. Furthermore, an analysis of the state of the art e-learning platforms and existing game engines was conducted. The results of this analysis indicated Unity (https://unity3d.com/) as the most suitable platform to host the envisaged serious game.

The second step included the development of a concept design about such games demonstrating the main structural idea behind them. The design proposed that every player will be involved in every day scenarios that assess and improve his/her personal skills, such as decision making skills and allow him/her to self-regulate. Figure 1 presents the main components of the GAME project technological

proposal. The game simulates pedagogical scenarios satisfying specific needs and exploiting pedagogical material from Open Educational Resources. A challenge in the game mechanics design is
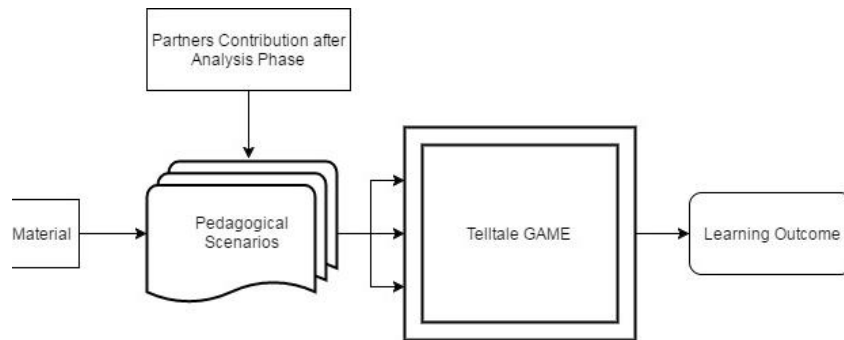
the co-operation among: e-learning experts, game developers, psychologists and anti-doping education experts.

Figure no.1. Main components of GAME project technological proposal

The third step in the development of the game involves the exploitation of flowcharts and mock-up tools to create a common understanding among its members. More specifically the psychologists and anti-doping education experts are presenting their pedagogical scenarios using flowcharts in order to decide the game flow, the user feedback, the awards, badges and the scoring system of the game. An example scenario involves education on the health consequences of doping. This scenario involves the interaction of an exerciser with his personal trainer. The story is based on the exerciser's need to improve performance by using means other than training and nutrition. The interaction between the exerciser and the personal trainer is structured in the form of a) questions made by the exerciser about his options for improving his performance, b) questions by the personal trainer about his knowledge about performance enhancing substances, and their effects on health, c) exerciser's knowledge and intention towards using performance enhancement substances, and d) feedback on substances' health side effects. A part of this scenario is highlighted in Figure no.2.
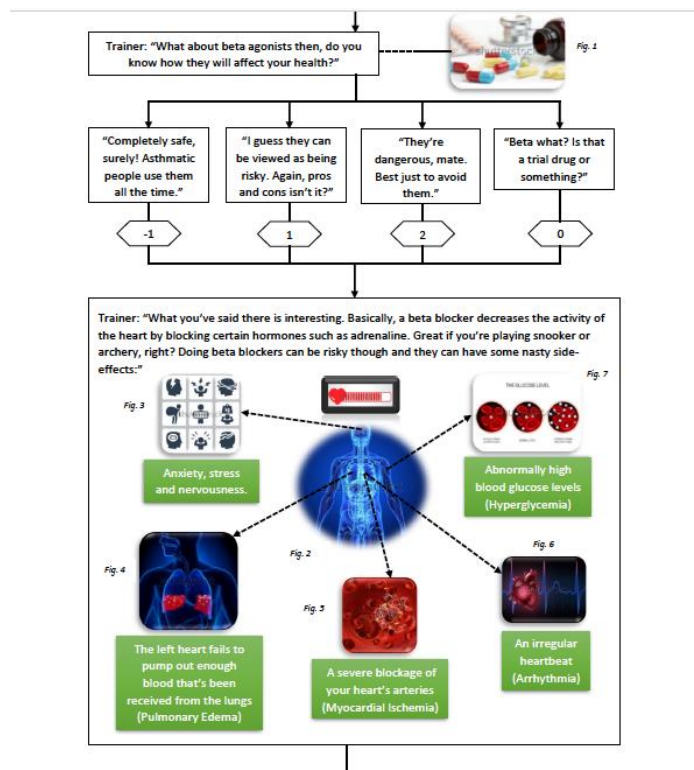

Figure no.2. Sample scenario flowchart

IV.   CONCLUSIONS

Anti-doping education should follow new trends and incorporate modern learning pedagogies in order to be effective. The development of a serious game helps in this direction. The development of the serious game envisaged in project GAME is based on sound theoretical background and focuses on key constructs and concepts that influence the decision making processes towards doping, utilises the most effective platform for this type of games and incorporate aspects of innovative pedagogical approaches. Importantly, the envisaged serious game is the first game of this type that aims at doping prevention. It is expected that it will provide a solid tool for stakeholders aiming to promote anti-doping education in young athletes and exercisers and the basis for the development of more sophisticated serious games in the future.

Reference Text and Citations

[1]   Baranowski, T., Buday, R., Thompson, D. I., & Baranowski, J. (2008). Playing for real: video games and stories for health-related behavior change. *American journal of preventive medicine, 34*(1), 74-82.

[2]   Baranowski, T., Baranowski, J., Thompson, D., Buday, R., Jago, R., Griffith, M. J., Islam, N., Nguyen, N., … Watson, K. B. (2011). Video game play, child diet, and physical activity behavior change a randomized clinical trial. *American journal of preventive medicine, 40*(1), 33-8.

[3]   Barkoukis, V., Lazuras, L., Ourda, D., & Tsorbatzoudis, H. (2016). Tackling psychosocial risk factors for adolescent cybcrbullying: Evidence from a school-based intervention. *Aggressive Behavior, 42*(2), 114-122. https://doi.org/10.1002/ab.21625

[4]   Barkoukis, V. , Lazuras, L. , Lucidi, F. & Tsorbatzoudis, H. (2015). Nutritional supplements and doping use. *Scand J Med Sci Sports, 25*: e582-e588. doi:10.1111/sms.12377

[5]   Charlier, S.D., Guay, R.P. and Zimmerman, R.D. (2016). Plugged in or disconnected? A model of the effects of technological factors on employee job embeddedness, *Human Resource Management, 55*(1), 109-126.

[6]   Connolly, T. M,. Boyle, E. A., MacArthur, E., Hainey, T., & Boyle, J. M. (2012). A systematic literature review of empirical evidence on computer games and serious games. *Computers & Education, 59*(2), 661-686.

[7]   DeSmet, A., Veldeman, C., Poels, K., Bastiaensens, S., Van Cleemput, K., Vandebosch, H., & De Bourdeaudhuij, I. (2014). Determinants of self-reported bystander behavior in cyberbullying incidents amongst adolescents. *Cyberpsychology, Behavior, and Social Networking, 17*, 207-215. https://doi.org/10.1089/cyber.2013.0027

[8]   Englar-Carlson, M., Gleaves, J., Macedo, E., & Lee, H. (2016). What about the clean athletes? The need for positive psychology in anti-doping research. *Performance Enhancement & Health. 4*. 10.1016/j.peh.2016.05.002.

[9]   Epton, T., & Harris, P., Kane, R., Van Koningsbruggen, G., & Sheeran, P. (2014). The Impact of Self-Affirmation on Health-Behavior Change: A Meta-Analysis. *Health Psychology, 34*(3), 10.1037/hea0000116.

[10] Göbel, S., Wendel, V., & Ritter, C., & Steinmetz, R. (2010). Personalized, Adaptive Digital Educational Games Using Narrative Game-Based Learning Objects. 438-445. 10.1007/978-3-642-14533-9_45.

[11] Huang J, Wang S, Xu F, Wang D, Yin H, Lai Q, Liao J, Hou X, Hu M. (2017a). Exercise training with dietary restriction enhances circulating irisin level associated with increasing endothelial progenitor cell number in obese adults: an intervention study. *Peer J, 5*:e3669.

[12] Mikhaleva, G. (2016). *Media Culture and Digital Generation. International Journal of Media and Information Literacy*, Vol. 1, Is. (2),116–121

[13] Michael, D. & Chen, S. (2006) *Serious games: Games that educate, train, and inform*. Boston, MA.: Thomson Course Technology.

[14] Savery, J. R. (2006). Overview of Problem-based Learning: Definitions and Distinctions. *Interdisciplinary Journal of Problem-Based Learning, 1*(1). https://doi.org/10.7771/1541-5015.1002

[15] Wood D. F. (2003*).* Problem based learning. *BMJ, 326*, 328-330.

[16] Wouters, Nimwegen, C., Oostendorp, H. & D. van der Spek, E. (2013). A Meta-Analysis of the Cognitive and Motivational Effects of Serious Games. *Journal of Educational Psychology, 105*. 249. 10.1037/a0031311.