



An examination of anti-doping education initiatives from an educational perspective: Insights and recommendations for improved educational design



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ABSTRACT

The World Anti-Doping Agency (WADA) has declared that education is a central focus of their anti-doping strategy. This is evident in the expansion of Article 18 of the 2021 World Anti-Doping Code that focuses on education. Furthermore, at the 2019 World Conference on Doping in Sport, they launched the International Standard for Education. International standards are technical documents that further harmonize anti-doping efforts, to which Code signatories are required to follow for Code compliance. Before this, WADA developed an online platform, ADeL, to consolidate all of its e-learning resources and in August 2019, they hired a Director of Education to lead their education strategy. While these developments are likely applauded by anti-doping advocates, historically the efficacy of anti-doping educational programs to increase athletes' knowledge of doping has been very poor. The design of education programs has been criticized and even when they meet many of the current recommendations for program design, the results are not favorable. A partial explanation for this is that the design of past education programs has not been informed by principles from education and other related disciplines. This includes a lack of alignment between learning outcomes desired, the education activities performed, and the assessment of learning outcomes. In this monograph, previous educational initiatives are reviewed, and program design critiqued. WADA's education strategy is examined before recommendations for improved education design are made. This includes greater reliance on education programs that are constructively aligned and provide opportunities for athletes to develop knowledge via retrieval tasks.

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Contents

1. Introduction	1
2. Rising Importance of Education	2
3. Challenges with Educational Initiatives	3
4. Knowledge Outcomes of Educational Programs	4
5. Anti-doping Education Design	5
6. WADA's Education Initiatives	6
7. Lessons from Educational Theory	6
8. Conclusion	8
Funding	8
References	8

1. Introduction

Nearly a half-century ago, scholars bemoaned the quality of anti-doping education provided to athletes and called for greater emphasis to be placed on education (Cooper, 1972; Thomas, Knotts, & Erickson, 1973). Since that time, there have been many advances

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in the anti-doping movement. These include the creation of the World Anti-Doping Agency (WADA) in 1999 and in 2003 the WADA Code; developments that have harmonized anti-doping rules and aligned efforts globally to prevent doping in sport. The Code is periodically amended with the 2021 version approved at the World Conference on Doping in Sport in November 2019. Similar to previous editions, Article 18 of the 2021 Code (WADA, 2019a) focuses on education, and mandates that International Sport Federations and National Anti-Doping Agencies deliver anti-doping education to athletes and athlete support personnel.

WADA has been increasing its emphasis on the role of education in doping prevention. This is evident in the draft of the 2021 WADA Code (WADA, 2019a) where education is featured prominently as one of the main purposes of the Code. In advance of this development, in WADA's 2015–2019 strategic plan they announced that one of their strategic priorities was to “Promote, advocate, and lead anti-doping education initiatives” (WADA, 2014 p. 15), which will be continued into the 2020–2024 strategic plan (WADA, 2019b). At the World Conference on Doping in Sport, WADA introduced, for the first time, an International Standard for Education (WADA, 2019c). International standards further attempt to harmonize anti-doping efforts by providing mandatory standards for Code signatories to follow. These documents have historically focused on more technical aspects of Code compliance, such as providing details of substances and methods on the prohibited list, testing procedures for laboratories, and the process of granting a therapeutic use exemption for the use of medications that otherwise would be prohibited. With the creation of an International Standard for Education, along with recent published guidelines for education programs (WADA, 2016), education is now represented at all three levels that WADA outlines as the main elements of the World Anti-Doping Program: the Code, International Standards, and Guidelines and Models of Best Practices (WADA, 2019a). In their most recent annual report, WADA (2018), p. 56) announced, “No longer is education a worthy but optional extra. Increasingly, it is an essential and central pillar of the global anti-doping program.” To lead their education strategy, WADA appointed a new Director of Education in late 2019. These developments are significant because WADA has been criticized in the past for the limited emphasis placed on education compared to other strategies targeted to address doping (Backhouse, 2015). Furthermore, past educational approaches have generally been described as lacking substance (Hoberman, 2013), and simplistic, amounting to the mere provision of information, such as fact sheets or guides (Houlihan, 2008).

While these developments are likely welcomed by anti-doping advocates, it is opportune to reflect upon the progress, or lack thereof, of educational initiatives since the time of Cooper's (1972) and Thomas et al. (1973) call for action, and to question whether recent efforts are truly progressive. In many respects, it appears little has changed. Scholars still routinely report that athletes at all levels (high school, collegiate, professional) have poor knowledge of doping (e.g., Hallward & Duncan, 2019; Morente-Sánchez, Zandonai, & Díaz, 2019; Turfus, Smith, Mansingh, Alexander-Lindo, & Roopchand-Martin, 2019). This should be alarming since the calls for improved educational efforts have been echoing for the last five decades.

Knowledge may not be sufficient to eradicate doping from sport. However, when it comes to educating people about doping, programs implemented to achieve this feat have produced very poor results. As will be argued later, this is likely because of the assumptions made on how people learn, and the lack of educational theory adopted to assist with the design and implementation of these programs. WADA (2016), in its efforts to prevent doping via education, has historically differentiated between ‘information’ and ‘education’, with the latter increasingly focused on what has been termed ‘values-based’ education. The information-

based approach has been heavily criticized for not affecting doping behavior (Backhouse, 2015). However, information does have a role to play promoting doping-free sport. Information, as an educational objective, aligns with Bloom's (1956a) cognitive domain that includes remembering and recalling knowledge, thinking, and other such problem-solving skills. Information can increase knowledge, which may then serve as a protective factor to prevent doping (Irving, Wall, Neumark-Sztainer, & Story, 2002), particularly inadvertent doping (Ntoumanis, Ng, Barkoukis, & Backhouse, 2014; Petróczy, Dodge, Backhouse, & Adesanwo, 2014) and knowledge increases are associated with decreased intentions to dope (MacKinnon et al., 2001). Furthermore, knowledge takes different forms (Anderson et al., 2001) and includes factual knowledge (e.g., knowing what substances and methods are prohibited), conceptual knowledge (e.g., understanding the rationale for prohibition), procedural knowledge (e.g., knowing the doping control process), and metacognitive knowledge (e.g., knowledge of what one knows). All of these forms of knowledge are relevant for anti-doping education.

In contrast, values-based education aligns with Bloom's (1956b) affective domain of educational goals, which includes changes in attitudes and values. WADA (2019c) describes values-based education as the development of individuals' personal values and principles. Previous research on affective educational outcomes, such as attitudes towards doping, are favorable (Backhouse, Whitaker, Patterson, Erickson, & McKenna, 2016). Where the biggest discrepancy lurks is with the extent to which athletes acquire knowledge about doping.

The purpose of this monograph is therefore to review previous research on doping education. Particular emphasis is placed on the design of educational programs and knowledge outcomes. This will not be a systematic review (other authors have done so – see Backhouse, McKenna, Robinson, & Atkins, 2007; Backhouse et al., 2016), but rather an examination and critique of previous work from an educational perspective. Based on the poor results witnessed from these programs in improving knowledge, it will be argued that the design and effectiveness of anti-doping education programs could be improved if greater reliance was placed on adopting research and principles from education and related disciplines. Given WADA's renewed focus on education, their recent efforts will be examined and critiqued. Suggestions will be provided for how educational programming could be improved and increase the likelihood that anti-doping education is, in fact, educational. To begin, a summary is provided on how education has become a key focus for preventing doping in sport, particularly among young athletes.

2. Rising Importance of Education

WADA's position, as stated in the International Standard for Education (WADA, 2019c p. 4), is that “an athlete's first experience with anti-doping should be through education rather than doping control”. As most athletic careers start and end early in one's lifetime, and because attitudes towards doping are formed early (Backhouse, McKenna, & Patterson, 2009), it has been recommended that education start early, when the athlete is still in school. Providing anti-doping education in school is an efficient way to reach many youth (Backhouse, 2015). This is further legitimized by the observation that not all young athletes will transition to elite sport, and a proportion may continue their participation in sport in some other way, such as a coach, or an official (Grossman & Gieck, 1992). Hence early education is warranted as youth will become the athletes and the athlete support personnel of the future. To facilitate anti-doping education in schools, in October 2019 WADA, as part of a collaborative effort, launched a free, cross-curricular teaching resource, “Sport values in every classroom” (WADA, 2019d), which is targeted

towards 8-12 year old children. Beyond these recent developments by WADA, it is worth revisiting earlier events that occurred in North America that galvanized demand for education on doping and drug use, particularly among young athletes.

Although the prominence of doping in sport has been rising throughout the 20th Century (Yesalis & Bahrke, 2002), several events are noteworthy. The Ben Johnson scandal at the 1988 Olympics sparked global media attention and discussion on doping in sport. Among medical practitioners, demand for education followed Buckley and colleagues' (1988) publication on the prevalence of anabolic androgenic steroid (AAS) use among high school students (Isetts, 1989). In Buckley et al.'s (1988) paper, they reported that nearly 7% of students had used AAS, of which a third reportedly started when they were 15 years old or younger. Although AAS use was linked with older teenagers, the specter of young boys using AAS generated demand from schools and parents for information on how to prevent this behavior (Isetts, 1989). The initiation of doping behavior at young age has also been a concern for policymakers and scholars. Laure (2000) reported in a brief manuscript abstract that doping can begin as young as eight years of age, and Stigler and Yesalis (1999) declared that among high school football players who admitted to using AAS, nearly 20% began doping before the age of 10. Such reports are clearly shocking.

However, caution should have been raised with these reports. Stigler and Yesalis's (1999) data are riddled with numerical inconsistencies, which they attribute, not to doubts about their data, but to further evidence that the scope of doping among youth is much worse than reported. While it may be accurate that these (presumably) post-kindergarten preadolescent children were knowingly swallowing or injecting themselves with AAS, one does have to question how these substances were acquired. According to Buckley et al. (1988), adolescent athletes were overwhelmingly obtaining AAS from the black market. How these children were able to afford these drugs remains an open question. But perhaps a more likely reason (beyond errors in data collection) for why the reports of AAS usage and initiation of use were so high is how 'steroids' were discussed and defined during this epoch. Media accounts made no distinction between AAS and other forms of more widely used steroids, such as adrenal corticosteroids (Isetts, 1989). Yet these substances were understood to be within the same category, which may have led to confusion among survey respondents when completing questionnaires.

This issue is raised for two reasons. First, when designing educational programs, what learning outcomes are appropriate for the intended audience should be accurately assessed. The accounts above, if accepted uncritically, could negatively influence the design of educational programs and what is taught. The second reason points to a larger problem that has plagued anti-doping research generally. The academic community has historically lacked credibility on doping (Wagner, 1989). Scholars who have examined historical accounts of 'common knowledge' regarding the prevalence and effects of doping have shown that the reports lack corroborating evidence, in part because of the rigorlessness of the research performed (López, 2014; Møller, 2005; Woolf, Mazanov, & Connor, 2016). Doping has been described as a substantial problem among young athletes with prevalence rates as high as 25% being reported (Goulet, Valois, Buist, & Côté, 2010). Yet these same accounts clump substances that are allowed out of competition (such as the decongestant medication Sudafed and asthma medication) with substances that are banned at all times. As will be emphasized below, previous research on doping education has often lacked rigor, particularly in terms of the interpretation of outcomes. If education is to be the foundation for the clean sport movement, as incoming WADA president Witold Banka declared at the seventh UNESCO Conference of Parties, then that foundation must be made on firm ground.

Still, there have been numerous studies that indicate the doping prevalence among young athletes is sufficiently large enough to warrant educational efforts targeted to them, as well as adult athletes. In Backhouse et al. (2016) review of doping in sport, the prevalence of doping among adolescents was generally in the range of between 1% and 5%. All things being equal, one would assume that being more knowledgeable of doping would be better than being ignorant. However, scholars have expressed concern that knowledge may increase doping, particularly among younger athletes, who may become curious to the effects of prohibited substances and subsequently experiment (Goldberg, Bents, Bosworth, Trevisan, & Elliot, 1991; Nilsson, Allebeck, Marklund, Baigi, & Fridlund, 2004; Yesalis & Bahrke, 2000), though such views do not appreciate that a two-sided message may inoculate youth from future solicitations to dope (McGuire, 1964, 1974).

Demand for education and more knowledge has also been prompted by the athletes themselves, although the relationship they have with education is complicated. For instance, athletes report that they believe education is important, and that it should start early, but at the same time they question its relevance to them and their sport, while also complaining about the quality of education they receive (Hallward & Duncan, 2019; Johnson, Butryn, & Masucci, 2013). Some state they want more education while simultaneously revealing they routinely skip opportunities when education is provided (Johnson et al., 2013) and others acknowledge that they have been informed, but still desire more (Somerville & Lewis, 2005). In sum, the demand for education is and has been for some time, high. However, providing education and actually educating athletes is easier said than done.

3. Challenges with Educational Initiatives

Educational initiatives are beset with numerous challenges. First of all, doping is a complicated, multifaceted topic making it an inherently difficult subject to teach (Hoberman, 2013), particularly if the target is young people. Some earlier approaches have fallen foul to this fact and presented information that was technical and arguably inappropriate for its intended audience (e.g., Thomas et al., 1973). Resource and capacity limitations have to be overcome (Morente-Sánchez & Zabala, 2013), even among anti-doping organizations that are required to deliver educational programs (Cléret, 2011). Logistical issues, such as scheduling and coordinating instructors, abound (Mottram, Chester, & Gibson, 2008), and with school-based programs, overstretched teachers are relied upon for program implementation (Backhouse, 2015). Even instructors who are brought in to teach specifically may doubt their expertise and desire more training (Mottram et al., 2008). All of these realities may lead to a diluted implementation of anti-doping education programs. Yet, when doping interventions are more comprehensively implemented (e.g., more educational activities performed, greater use of informational materials), they tend to produce better outcomes (Wicki, Kuntsche, Stucki, Marmet, & Annaheim, 2018).

From a broader perspective, a challenge of educating athletes is that efforts to promote and evaluate education programs are fragmented with organizations from many different levels (regional, national, and international) delivering programming independently (Hoberman, 2013), with inadequate coordination among them (Patterson & Backhouse, 2015). This increases the potential for mixed messages to be delivered. However, Cléret (2011), writing on behalf of WADA, stated that factual information is easy to convey. While it may be accurate that information is easy to relay, it is more difficult to teach and have the target audience learn the information provided. This is perhaps why the assessment of anti-doping education has sometimes been based on criteria

that is easier to measure (such as work performed) and therefore show compliance, rather than to actually show program effectiveness (Houlihan, 2008). Taken as a whole, education has been difficult to implement, and as such, there is a dearth of rigorously designed educational programs that have been systematically evaluated (Backhouse, 2015). It should not be surprising then that when previous research is examined, athletes' knowledge about doping is generally reported as being limited and the effectiveness of anti-doping education to improve knowledge arguably poor.

4. Knowledge Outcomes of Educational Programs

As previously mentioned, athletes at all levels of sport report limited knowledge of doping. However, it is beneficial to summarize and contextualize the level of knowledge observed. In the vast majority of studies, knowledge is assessed using a series of multiple-choice questions with 2 – 4 response options. For example, Jamaican adolescent athletes (aged 12–19) were presented with a 31-item true-false quiz on the Code and scored, on average, 38% (Turfus et al., 2019). Japanese university student athletes had their knowledge assessed using the twelve 4-item multiple-choice exam used at the end of WADA's Athlete Learning Program about Health and Anti-Doping (ALPHA) e-learning module. The students in this study answered questions correctly 64.54% of the time, and among students who had received anti-doping education more than once previously, the average score rose to 67.43% (Murofushi, Kawata, Kamimura, Hirose, & Shibata, 2018). These results are below the 80% threshold that WADA has for the successful completion of this module. In a study with a general population of Polish athletes, participants answered a 3-response option (True, False, I Don't Know) 45-item questionnaire to assess their knowledge of the Code. The average score was 45.22%, which was described as a "rather moderate level of knowledge" (Sas-Nowosielski & Świątkowska, 2007, p. 60). Orr et al. (2018) assessed a large and diverse sample of Australia athletes, who were quizzed on the banned status of various substances with four response options (banned at all times, in competition only, not banned, don't know). Participants were correct 32.2% of the time, although, they performed better when quizzed on well-known doping substances and methods. An open response question format was included where participants were asked to list the desired and adverse effects of AAS, growth hormone, EPO and amphetamines. Knowledge scores were described as moderate, ranging from 31.0 - 64.0% correctly identified desired effects, and 14.3 - 42.4% correctly identified adverse effects. Of note, athletes in this study believed that they were moderately or well informed on doping, with a slight majority having previously received anti-doping education. A final example involves professional and amateur soccer players who had knowledge assessed using four questions. According to Morente-Sánchez et al. (2019), no-one in their sample of over 1300 athletes knew what was on the prohibited list, while 52.6% were able to correctly identify WADA's criteria for inclusion on the prohibited list when four possible answers were provided to them. From this synopsis of athletes' knowledge, one may conclude that knowledge is indeed poor. However, valid criticism is to ask whether it is reasonable to expect athletes to have a comprehensive knowledge of the Code, particularly if they are young, are a recreational participant, or have not received anti-doping education. Unfortunately, when we examine the effectiveness of educational programs, even when they demonstrate that athletes' knowledge has statistically significantly improved after the program, their comprehension of doping is still poor.

One of the better-known doping education programs is Goldberg and colleagues (1996a, 1996b, 2000) Adolescents Training and Learning to Avoid Steroids (ATLAS) program. ATLAS is

a team-based intervention run over eight 50-minute classroom and eight weight training instructional sessions. The program features many of the components advocated today (e.g., Backhouse et al., 2009; Hauw, 2017; Houlihan, 2008; Martin & Anshel, 1991). This includes providing information on AAS, challenging normative perceptions, promoting alternatives to AAS, and critiquing media messages. The program is led by peer leaders with the support of coaches and is accompanied by scripted manuals and a curriculum for ease of implementation outside of the research setting. One single hour and a half session is conducted with parents and guardians who are encouraged to be engaged with their child's homework assignments.

In Goldberg, Elliot, Clarke, MacKinnon, Zoref et al. (1996a) pilot study they reported knowledge improved substantially post-intervention, but their measures of knowledge appeared to be a self-assessment where participants answered questions using a 7-point Likert type scale anchored with statements such as "good knowledge", "very correct" and "poor knowledge" "very incorrect". The follow-up study (Goldberg et al., 1996b) included an 18-item, true-false scale on the effects of AAS. It was reported that participants' initial knowledge scores were 10.64/18 and significantly increased post-intervention by 40.3% SD (where SD = 4.42), which means that students' mean scores increased by approximately 1.78 to 12.42. In effect, after approximately 16 hours of contact time accompanied with homework, participants in the experimental condition increased their knowledge scored from 59.1% to 69.0%. Phrased another way, students increased their score by less than 2 correct answers on a true-false quiz and still scored less than 70%. While we might praise the fact that 'knowledge' increased, most educators would not be pleased by this level of knowledge or improvement with their students, especially given the coarseness of the measurement instrument used.

A later study of ATLAS (Goldberg et al., 2000) reported similar findings with knowledge of the effects of AAS increasing from 59.5% (10.72 / 18) to 67.3% (12.11 / 18). Although it is noteworthy that in their sample of 1506 adolescent football players, significantly fewer athletes began steroid use in the experimental group (n = 3) by the end of the season than the control group (n = 8). Programs that were modeled after ATLAS have produced comparable results. In the Hercules program (Sagoe et al., 2016) participants engaged in four 90-minute theory sessions, one of which focused on doping, and participated in a 12-week strength training program (a theory only and a control group were used for comparisons). Knowledge was assessed using a 21-item multiple-choice questionnaire and increased from 37.2% to 43.3% correct answers in the combined theory-practice program. This equated to approximately one more correct answer on the quiz after the intervention. Better results were observed in Iran, where young male gym members participated in six hour-long educational anti-doping sessions with knowledge assessed before and after the intervention using an 18-item true-false quiz (Jalilian, Allahverdipour, Moeini, & Moghimbeigi, 2011). Post-intervention, the experimental group significantly increased their scored compared to the control group and knowledge rose from 37.9% to 63.3%.

Even with this last study, these results should not be encouraging for those who value education. Furthermore, researchers have set a low standard for what they consider to be good and moderate indicators of knowledge. For example, Seif Barghi, Halabchi, Dvorak, and Hosseinnejad, (2015) stated that scores above 70% on a true-false quiz represented a good knowledge level, while similar to Sas-Nowosielski and Świątkowska (2007), those that scored in the 40th percentile range, were considered to have moderate levels of knowledge. At least with these previous studies, knowledge was operationalized. Other studies (e.g., Elliot et al., 2004; Goldberg et al., 1991; Goldberg et al., 1996a; Rodek, Sekulic, & Kondric, 2012; Yager, McLean, & Li, 2018) have used self-assessments of knowl-

edge, where participants rated how knowledgeable they believe themselves to be or the extent to which they agreed with a statement. This latter example is arguably a measure of one's confidence in an answer, rather than knowledge per se. All of this reinforces the notion that when it comes to educating athletes about doping and improving their knowledge, previous attempts have fallen short. Examining the design of these programs provides some answers to why this is the case.

5. Anti-doping Education Design

Guidelines for the design of anti-doping prevention programs have come from other fields that examined behavioral prevention-based interventions, particularly among youth (Backhouse et al., 2009; Backhouse, Patterson, & McKenna, 2012). Recommendations for the design of programs have received consistent descriptions. These included that programs should begin early, be multi-faceted, involve multiple sessions coupled with periodic reinforcement, be peer-led, provide alternatives to drug/doping use (such as strength training and nutrition education), develop refusal skills, include parental involvement, address normative perceptions of drug/doping use, and be specific to athletes' sport and stage of career (Backhouse et al., 2009; Goldberg et al., 1991; Houlihan, 2008; Martin & Anshel, 1991; Palmer, Davis, Sher, & Hicks, 1989).

Previous anti-doping educational efforts, such as ATLAS, ATHENA, and Hercules, have been designed using Bandura's (1977) social learning theory, the health belief model (Janz & Becker, 1984) and the theory of planned behavior (Ajzen, 1985), though the latter two theories are not theories of learning per se. With social learning theory, youth learn through observing those around them and encoding and later mimicking their behavior. While this approach may be beneficial for some type of learning (for example, strength training techniques or behavioral norms), it is less explanatory for knowledge outcomes. Design recommendations or statements have been made that refer to learning theories. For example, Backhouse et al. (2012) recommended using active learning strategies (e.g., discussion activities and role-playing) and Cléret (2011) declared that experiential learning theory was incorporated into WADA's educational materials. However, little elaboration is provided on what these approaches entail or how they achieve the desired learning outcomes. For instance, it would be of benefit to know what aspects of WADA's educational materials are related to Kolb's (2014) experiential learning cycle (concrete experiences, reflective observation, abstract conceptualization, and active experimentation) and how this is assessed. As noted, programs such as ATLAS, have incorporated some of these suggestions above with limited effect.

Of greater concern is when program design is either not informed by theory, as this may obscure the explanatory mechanism for program outcomes, or when suggestions are intuitively appealing but are not supported by empirical evidence. For example, Sagoe et al. (2016) hypothesized that including strength training with theory sessions would lead to greater knowledge than if just theory sessions were provided. It is unclear how this would occur unless the process of strength training was accompanied with information on doping. Barkoukis, Kartali, Lazuras, and Tsorbatzoudis, (2016) designed a program to develop an anti-doping culture in schools that included using elite athletes as role models, though other research has challenged the influence of such figures (Woolf, Rimal, & Sripad, 2014). Other suggestions include matching program design to the athlete's learning styles (Hallward & Duncan, 2019; Houlihan, 2008). The theory is that if information is presented in a manner that aligns with one's preference for how they perceive they learn, then greater learning will occur. However, there is little to no empirical evidence

to support this claim and the matching of a learning style to the presentation of information does not lead to enhanced learning outcomes (Kirschner & van Merriënboer, 2013). Finally, in efforts to improve program design, scholars have solicited advice from the athletes themselves (Hallward & Duncan, 2019; Johnson et al., 2013). While this provides insights into athletes' experiences, athletes are not proficient in educational theory or the design of educational programs. This can lead to recommendations from athletes that lack practical utility or specificity (e.g., make education maximally impactful). Athletes may identify mediums, such as Twitter, as excellent sources of information, yet the quality of that source and the extent to which it serves to educate them is left unanswered. The focus on athletes' input may have been influenced by the concept of 'student-centered' learning. In fact, at WADA's 2018 Global Education Conference, the 10-point 'Beijing Declaration' explicitly states that "Athletes will remain at the center of education programs" (WADA, 2018, p. 57). It is unclear what this means in practice, though it should be noted that the concept of student-centeredness, at least in the higher education context, emphasizes the importance of the learner taking responsibility and accountability for their learning (Lea, Stephenson, & Troy, 2003). It is not a consumer-based model where the customer/athlete is placed at the center of all activities with their satisfaction being paramount.

There are, however, several scholars that have made recommendations for the design of anti-doping education that incorporates education theory. Mazanov, Backhouse, Connor, Hemphill, and Quirk, (2014) suggested that andragogy (Knowles, 1980) inform the design of adult anti-doping education programs. In brief, this approach states that adults will enhance their learning when education is relevant to them and incorporates their life experience into the design of educational programs. That education should be situated into people's lived experiences is also reflected in Hauw's (2017) ideas for program design. Hauw argues that anti-doping education needs to be context-specific, take a lifespan approach, and provide opportunities for meaning-making so that understanding can develop. Meaning-making is also reflected in Hanson's (2009) work. He advocates for a constructivist approach where learners are immersed with the subject material coupled with engagement with other learners to develop comprehension. Peer to peer learning features heavily in his recommendation. Hanson is also against the direct transmission of knowledge and the memorization of information. His argument is that the memorization of information is not an indication of comprehension. However, knowing anti-doping rules, doping control procedures, and athletes' rights and responsibilities are surely of benefit to athletes. Hanson's issue has more to do with the prospect that athletes are taught to memorize moral messages, a prospect that Hoberman (2013) equates to standard civic training where youth are taught not to break rules.

There are several limitations to Hauw's (2017) and Hanson's (2009) approach that they acknowledge, such as the logistics of implementation. Those charged with the administration, such as teachers and coaches, have other priorities that would limit their ability to comply with the demands set before them. Additionally, these approaches assume that knowledge will be generated and transmitted. The outcomes from programs such as ATLAS and others (e.g., Barkoukis et al., 2016) that incorporate approaches designed to promote autonomous learning and discovery demonstrates that positive learning outcomes may not occur. Furthermore, with peer or participant-led approaches, anti-doping organizations cede control over what is learned, which could influence affective learning outcomes. This could be problematic for advocates of clean sport, as there is no guarantee learners will conclude that doping should be eliminated from sport, or that one should not engage in doping. Such an approach assumes that all

athletes share similar values (Hoberman, 2013). Furthermore, as athletes learn about the complexity and nuance that surrounds doping their attitudes towards doping tend to become more favorable, although overall this is still negative (Elbe & Brand, 2016). This means that rather than just advocating for open discussion and self-discovery, educational programs should ensure that those who oversee the implementation of these programs, whether these are peer taught or instructor-facilitated, are well trained. It also bears emphasis that while adolescents can learn from their peers, they also value learning from health experts (Rodríguez-Serrano, Timpka, Ekberg, Dahlström, & Jacobsson, 2018).

In sum, recommendations for how anti-doping education programs should be designed have existed for several decades. While increased knowledge is shown in some studies, competency, as a learning outcome is not. Suggestions have been made that are based on theories of learning, though these often target higher level, critical thinking skills, while being critical of approaches that focus on lower levels of cognitive complexity, such as memorization. In other cases, recommendations do not provide an account of how learning will be achieved and instead assume that it will. This amounts to a 'provide it and they will learn' approach to education. The need for a more systematic approach to anti-doping education is warranted and WADA's recent efforts demonstrate a commitment to providing education. Before examining how anti-doping education programs can be improved, WADA's current educational initiatives will be summarized.

6. WADA's Education Initiatives

WADA has expanded its efforts to promote education as a prevention measure to curtail doping in sport. In January 2018 they launched the anti-doping e-learning platform (ADeL), which provides a centralized location for WADA's e-learning resources. This includes the recent version of ALPHA 2.0 (identified earlier) and other online tutorial programs targeted at specific populations, such as coaches (CoachTrue), parents (Parents' Guide), and physicians (Sport Physician's Toolkit). The ALPHA module takes athletes through a series of lesson topics (e.g., whereabouts policy, medical/ethical reasons to stay clean, how to deal with pressure) and concludes with an attitude survey, followed by a 12-item multiple-choice test is used to assess athletes' knowledge. Other resources available at ADeL include links to the Code, the Prohibited List, summary sheets of information, and website addresses of other anti-doping organizations and international sport federations.

WADA's guidelines for information and education programs (WADA, 2016) differentiates between the purpose of information (to provide factual knowledge) and education (to foster anti-doping behavior). It contains guidelines for planning a program, setting goals, writing an action plan, and evaluating the program. Definitions are listed and sample planning worksheets are provided. Such resources should assist anti-doping organizations tasked with implementing an education program. Other activities include WADA's Athlete Outreach program, which is run at sport events where athletes can talk with representatives about doping, the doping control process, sign a personal pledge for being a doping-free athlete and play a timed online quiz.

However, the most significant development in WADA's efforts is the creation of the International Standard for Education. This is important for several reasons. First, it requires Code signatories to cooperate with others and coordinate educational efforts. This minimizes duplication and addresses the issues with program fragmentation described earlier. Second, it specifically recommends programs be designed using education theory and be evidence-based, for which previous programs have tended to fall short. The most recent example of this policy is the collaboration WADA

formed with multiple parties to create the "Sport values in every classroom" teaching toolkit. Hellison's (2011) teaching for personal and social responsibility model provides the basis of the design of this program. In Hellison's model, children progressively learn how to be personally and socially responsible, from more passive actions (e.g., being respectful) to more active (e.g., helping others, being cooperative). Three core values, identified as being synonymous with sport (respect, equity, and inclusion) are taught via 30 activity cards that incorporate games, discussions, and role-playing activities. Importantly, along with the core values and learning strategies, guidelines for assessment are provided.

Third, an emphasis is placed on anti-doping education being provided by trained educators. The current requirements for this are vague, but in the 2021 Code, it is explained that this is designed to elevate the standing of such a role so that it is on par with other technical staff required for Code implementation and compliance. Finally, although WADA has historically framed education as being information or values-based (the latter taken prominence), the new standards for education promote awareness raising and anti-doping education as additional components. This final aspect is defined as "Delivering training on anti-doping topics to build competence in clean sport behaviors and make informed decisions." (WADA, 2019c p.10). Potentially, this may provide new strategies for approaching anti-doping education and moving away from the simple split of information transmission versus value installation. However, as will be discussed below, while WADA is making several positive steps to promote education, there are still areas for improvement, particularly in terms of knowledge development.

7. Lessons from Educational Theory

Athletes' knowledge of doping has remained poor for the last 50 years. Even with WADA's announced efforts to make education a central pillar of doping prevention the likelihood that this will change is low. The reason for this is because of the lack of alignment between what WADA requires from athletes, the methods they employ to assist athletes in this venture, and then how they assess whether athletes have satisfied this requirement. At various education levels, the concept of aligning each of these components is described as backward design (Wiggins & McTighe, 2005), constructive alignment (Biggs & Tang, 2011), and integrated course design (Fink, 2013). These different models share similar components, though Fink (2013) distinguishes his model from others by stating it is relational, rather than linear. The significance of this is that it serves to ensure that each component (learning outcomes, education method employed, and learning assessed) are aligned with one another. In contrast, when models are linear the integration of each of these components is not guaranteed. For instance, logic modeling has been proposed as a means to develop anti-doping education programs (Patterson, Backhouse, & Duffy, 2016). However, logic modeling presents a sequence of events and identifies program characteristics required to transform inputs into outputs and produce intended outcomes. Activities performed can be quantified, such as the number of lessons conducted. However, the alignment of all three components is not the main consideration of linear models, whereas, with a relational model, an examination of how many of the three components are aligned can produce a stronger program design (Anderson et al., 2001).

For example, Article 2 of the Code (Anti-doping rule violations) states that "Athletes or other Persons shall be responsible for knowing what constitutes an anti-doping rule violation and the substances and methods which have been included on the Prohibited List." (WADA, 2019a, p.13). Based on this statement, one would assume that this is a learning outcome for WADA's edu-

cational initiatives targeted towards athletes who are subject to the Code. If educational components were aligned, then learning activities would be structured so that knowledge of anti-doping rule violations and the prohibited list would be learned, and that the assessment of this learning would reflect this knowledge. Currently, they are not because the many approaches WADA takes are not designed to develop knowledge.

An effective way to learn what constitutes an anti-doping rules violation and what is on the prohibitive list would be to challenge athletes to practice retrieving this information from memory (Karpicke & Roediger, 2008). The process of retrieving dampens forgetting (Ebbinghaus, 1964). Thus, intermittent opportunities to be assessed, or even encouraging athletes to self-assess, would provide occasions to engage in retrieval practice. Moreover, engaging in interleaving practices, where topics to be learned are tested in different configurations rather than in sequence also improves learning (Rohrer & Taylor, 2007). For example, rather than having athletes list each of the eleven rule violations (discouraging or retaliating against reporting to authorities was recently added) in order, they would be tasked to recall this list in a different order and with other tasks. This could include retrieving the twelve values (the twelfth value – Athlete's rights – was added to the 2021 Code) listed in WADA's Spirit of Sport statement (WADA, 2019c p. 10). The importance of athletes knowing information is highlighted in a press released statement from Amanda Hudson, WADA's Director of Education (WADA, 2019e):

It is likely clear to most people that doping is cheating, steroids are banned and athletes can be tested. However, what is possibly not so clear to all is the complexity of the anti-doping system, i.e.: the ten different types of Anti-Doping Rule Violations (far more than simply failing a urine test); the regulation required to harmonize anti-doping globally – not just the Code but also the UNESCO International Convention against Doping in Sport; and, the simple fact that there are many substances banned in sport, some of which can be found in everyday over-the-counter medications. Equally, and very importantly, helping those bound by anti-doping rules to understand them; as well as, their rights and responsibilities is something WADA and our stakeholders must continue to commit to.

However, WADA's activities are not aligned to achieve this outcome and their stance is that information should be provided (not that athletes' knowledge is developed) and that values-based education remains the focus of their programs. ADeL and ALPHA provide access to information. This includes dense policy documents, such as the Code, which are not exactly reader-friendly for athletes to read and digest. Moreover, reading the Code is still a passive approach to learning, which is unlikely to lead to retention, unless the strategies described here are followed (Karpicke & Roediger, 2008). Online tutorials provide more dynamic mediums of information presentation, however, these then culminate in a short multiple-choice test (where the task here is short term recognition tasks – not retrieval). These activities encourage surface-level forms of learning at best, which is superficial, rather than deep forms of learning, where comprehension can develop (Tagg, 2003). It should not be surprising then that athletes' knowledge about doping remains poor.

Memorization might be criticized for being superficial, and scholars have been critical of anti-doping education that focuses on memorization (Hanson, 2009). However, having a base level of knowledge (i.e., recall) is necessary for higher levels of cognitive complexity, such as comprehension. Bloom's (1956a) taxonomy of cognitive educational objectives provides a means to differentiate between the types of understanding a learner has acquired. This taxonomy, which has since been updated by Anderson et al. (2001), lists these levels as recall, comprehension, application, anal-

ysis, evaluation, creation/synthesis. Thus, if we want athletes to be able to have a deep understanding of how the values listed in the spirit of sport relates to their experience and promotes clean sport (as recommended by Mazanov et al., 2014), then it would be beneficial if athletes knew what these values were. Importantly, there are other aspects of doping compliance that would be beneficial for the athletes to know and be able to recall from memory. These include the doping control process, the results management process, and their rights and responsibilities.

Moreover, the continual process of retrieval enables these constructs to be further encoded into long term memory and the development of mental models (Dudai, 2004), such as Hudson's observation of the complexity of the anti-doping system. It seems that rather than have athletes know what they need to know for Code compliance, scholars are more concerned with having athletes engage in higher levels of cognitive complexity and develop into muscular moral philosophers. Advocating for athletes to become higher-level critical thinkers isn't necessarily a problem. Designing educational programs to focus primarily on this as the goal is. Consider where the demand for such programming is coming from. While some athletes may welcome this, likely many would not for various reasons. However, knowing how to stay in compliance and what one's rights and responsibilities are is directly relevant to these athletes. And therefore, as outlined in WADA's documents and Article 7 of the Anti-Doping Charter for Athletes Rights, there is a duty not to just provide this information, but ensure it is packaged in a manner that it will be learned, such that athletes know, understand and can apply this information. Modern technology, such as apps and the use of gamification could aid in this process provided that the focus remains on retrieval and not recognition tasks.

This is not to argue that values-based education is abandoned in place of developing knowledge. Nor is it to suggest that Code compliance knowledge be targeted towards all athletes at all levels. It does suggest that the learning objectives should be specific for the intended audience. Hoberman (2013) has been skeptical of the efficacy of moral messages with adult athletes, though it may still be important for developing a clean sport culture. Education targeted at adolescent athletes needs to consider that this is not a homogenous group and adolescents go through different stages of development. With younger athletes, knowledge development may need to be limited (such as knowing the rationale for inclusion on the prohibited list) and for the very young (e.g., under 10 years of age) it may be counterproductive to teach them explicitly about doping (Onrust, Otten, Lammers, & Smit, 2016). Instead, with younger athletes, attention should be on promoting healthy behaviors, such as eating well and training appropriately. Teaching values, such as respect, equity, and inclusion, as WADA does with their new program, also appears relevant. This is why data, particularly historical data, should be closely scrutinized, lest we are left to conclude that those who eventually dope, initiate this behavior as children.

For older adolescent athletes the issue of what to teach becomes more complicated. For instance, the significance of peers changes as young athletes move from wanting to be part of the group to develop their own individuality (Onrust et al., 2016). This means that when educational programming is designed it needs to explicitly consider what are the learning outcomes desired, what activities will be appropriate to achieve this outcome, and how will educators know it has been achieved. Backhouse (2015) has emphasized that learning outcomes need to be clear, and WADA (2019c) states that these need to be measurable. However, for a learning outcome to be measurable, it needs to be observable. WADA's (and in Backhouse's example) learning outcomes are currently recommended to take forms that are largely internal (e.g., awareness, understanding) and have yet to be operationalized. While understanding can be operationalized based on knowledge (e.g., the

ability to recall the criteria for an anti-doping rule violation), doing so for values-based education will prove to be more challenging, though the affective domain of Bloom's (Bloom, 1956b) taxonomy of educational objectives may provide direction. Ultimately though, if WADA and other anti-doping organizations want their athletes to know the Code, or be knowledgeable about doping, emphasis need to be placed on developing lower levels of cognition (such as recall and comprehension). Learning activities should match the desired outcome and that means athletes being able to recall the information they are expected to know.

8. Conclusion

Houlihan (2008) argues that education (information and knowledge) may prevent doping under conditions where people are either ignorant or incompetent. This assumes that if someone makes the conscious decision to dope, knowledge will have no impact. However, a baseline level of information is not only desirable, it is mandated by both WADA and the Charter of Athletes Rights. Furthermore, as mentioned earlier, it is necessary for developing mental models. Athletes' knowledge has been low for the last fifty years because education programs have not been designed to develop knowledge – at least not in an effective manner. WADA's new International Standard for Education is a welcome addition to doping prevention. However, knowledge is unlikely to change unless education programs integrate recommendations from education and other related disciplines into their design. This will hopefully ensure that in fifty years, we are not asking the same question – why don't athletes know more about doping?

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