'Clean athlete status' cannot be certified: Calling for caution, evidence and transparency in 'alternative' anti-doping systems

Accepted *International Journal of Drug Policy,* October 30 2020

Andrea Petróczi[1]
Kingston University London
UK

Susan H Backhouse
Leeds Beckett University
UK

Ian D Boardley
University of Birmingham
UK

Martial Saugy
University of Lausanne
Switzerland

Yannis Pitsiladis
University of Brighton
UK

Marjolaine Viret
University of Lausanne
Switzerland

Gregory Ioannidis
Sheffield Hallam University
UK

Fabien Ohl
University of Lausanne
Switzerland

Sigmund Loland
Norwegian School of Sport Sciences,
Norway

Mike McNamee
KU Leuven Belgium,
Swansea University,UK

Highlights

- Attempts to certificate 'clean athlete status' are scrutinised on multiple grounds.

- The need for transparency, evidence and scientific scrutiny is highlighted.

- Clean sport and anti-doping are discussed in the broader scope of sport integrity.

- Instituting ways to show due diligence in compliance with anti-doping is

  recommended.

Abstract

Athletes, sponsors and sport organisations all have a vested interest in upholding the values of clean sport. Despite the considerable and concerted efforts of the global anti-doping system over two decades, the present system is imperfect. Capitalising upon consequent frustrations of athletes, event organisers and sponsors, alternative anti-doping system have emerged outside the global regulatory framework. The operating principles of these systems raise several concerns, notably including accountability, legitimacy and fairness to athletes. In this paper, we scrutinise the Clean Protocol™, which is the most comprehensive alternative system, for its shortcomings through detailed analysis of its alleged logical and scientific merits. Specifically, we draw the attention of the anti-doping community – including researchers and practitioners – to the potential pitfalls of using assessment tools beyond the scope for which they have been validated, and implementing new approaches without validation. Further, we argue that whilst protecting clean sport is critically important to all stakeholders, protocols that put athletes in disadvantageous positions and/or pose risks to their professional and personal lives lack legitimacy. We criticise the use of anti-doping data and scientific research out of context, and highlight unintended harms that are likely to arise from the widespread implementation of such protocols in parallel with – or in place of – the existing global anti-doping framework.

As authors, we write to express our concerns regarding a so called 'certification programme' – the **Clean Protocol^{TM}** – that claims to be able to provide *proof* for athletes that according to their protocols they are "clean" athletes. On the **Clean Protocol^{TM}** website it states "*You pride yourself on being a clean athlete. Now there is an easy way to* prove *it. Get clean certified.*"[2]. This promise of proving "clean" status is no doubt appealing to many, given the importance of that label to anti-doping stakeholders. When clean sport exists, athletes can contest their capabilities within a sport context where outcomes are determined by natural ability, hard work, tactics and, to some extent, access to resources and luck (Loland, 2019; Loland & McNamee, 2019). Whilst it is accepted that doping will never be completely eliminated from sport (Dimeo, 2016), protecting the rights of athletes to compete in clean sport remains the goal of those seeking to protect the integrity of sport and the welfare of athletes.

The World Anti-Doping Agency was established in 1999 to establish a global system to promote and protect clean sport. It is now widely recognised that a successful anti-doping system cannot rely on testing alone. Critiques of the current anti-doping system (e.g., Berry, 2008; Maennig, 2014; Pielke & Boye, 2019; Pitsch, 2009) tend to focus on the relative (in)effectiveness and costs of testing, and imply that an effective anti-doping system only requires political will (e.g., Pielke, 2018). Indeed, the complex, stigmatised and deceptive nature of doping behaviours are embedded in sporting culture and may involve collusion or complicity of an entourage (Hughes & Coakley,1991; Waddington & Smith, 2009). However, in reality, any anti-doping programme has to respond to a dynamic and interdependent system, and must overcome significant methodological and logistical challenges. An effective response requires a multidimensional global solution that encompasses approaches from all relevant research disciplines, stakeholders, sponsors and industry partners (Pitsiladis et al., 2019; Viret, M., 2020a). Critical to this whole-system approach (Backhouse et al., 2018) are athletes whose voices have been amplified in recent years through a growing number of advocacy groups.

Clean Protocol^{TM} is an online system designed to enable athletes to prove their adherence with anti-doping regulations (i.e., their 'cleanness') via an independent and confidential multi-layered certification process[3]. In its promotional material it states that "*Clean Protocol^{TM} applies the highest anti-doping standards across all disciplines and applies the latest available*

---

[2] http://cleanprotocol.org; accessed on 13/10/2020
[3] Clean ProtocolTM is administered by a non-profit organisation, the World Clean Sports Organisation (WCSO), which is registered in Switzerland.

testing technologies. The technology behind the Clean Protocol™ will screen out those athletes and their entourage who are not 100% clean"[4]. The protocol comprises nine levels (Table 1). According to the Clean Protocol[TM] website, these segments have been designed on advice from a range of experts in psychology, neuroscience, and sports physiology to form what "*is the most advanced system of clean sports authentication in the world*"[5].

We concur with the World Clean Sport Organisation (the legal entity behind the Clean Protocol[TM]) when they state that "*Clean athletes deserve credible sport*". Nevertheless, the promise that clean status can be 'achieved' through compliance with at least seven of the nine levels of the proposed "*multi-tiered verification of clean sports authentication*" – comprising behavioural, psychological and physiological indicators of doping – has no scientific evidence base. Criticisms of doping-related psychometric tests as diagnostic tools in an earlier iteration of the Clean Protocol[TM] still hold (Petróczi et al., 2015a, 2015b) holding, we raise further concerns with the revised protocol here.

First, we take issue with the concept of a 'testing' programme that claims to prove an athlete is clean. It is not possible to prove innocence as it is not possible to prove the absence of an unspecified being, act, effect or relationship. For this reason, the presumption of innocence is enshrined within universal human rights instruments and is a fundamental principle of most legal systems. In the World Anti-Doping Code, any athlete who has not been shown to have committed an anti-doping rule violation (ADRV) is to be considered a 'clean athlete'. Thus, Clean Protocol[TM] is a product that purports to provide athletes with something which is redundant (because they are already entitled to it) and chimerical (because it cannot be secured).

Secondly, the Clean Protocol[TM] misuses doping-related psychometric instruments. None of the listed tests – including those developed by authors of this letter – were developed or validated for diagnostic purposes. These measures do not represent proxies for doping behaviour (Petróczi & Aidman, 2009, Gucciardi et al., 2010) or broader unethical conduct in sport (i.e., Boardley & Kavussanu, 2008). Inferring doping from attitudinal measures is problematic. In two meta-analyses it has been shown that attitude is not a noteworthy predictor of doping

---

(Ntoumanis et al., 2014; Blank et al., 2016). Even with research showing that athletes who admitted doping exhibit more lenient attitudes toward doping, all athletes generally express negative doping attitude, including confessed users. (Petróczi et al, 2010; 2011). Of course, those who deny doping can successfully create an attitudinal profile consistent with 'clean' status.

Furthermore, it is unclear how the proposed cut-off values for scores derived using these measures are to indicate 'clean' status, or how these were established. This element was challenged five years ago (Petróczi et al., 2015a; 2015b). Similarly, social desirability tests (e.g., Crowne & Marlowe, 1960; Paulus, 1989; Stoebel, 1999) are designed to assess propensity for impression management and/or socially desirable responses, and should be co-administered with other psychometric scales (Leite & Nazari, 2017; Holden & Flekken, 2017; Paulhus, 2017; Perinelli & Gremigni, 2016). They are not intended for individual diagnostic purposes.

Thirdly, instruments based on Event Related Potential (ERP) such as deception-detectors (e.g., Ben-Shakhar, 2012; Cook et al., 2012; Gamer & Pertzov, 2018), or latency-based measurements such as the autobiographical Implicit Association Test (aIAT, Agosta & Sartori, 2013) or the Concealed Information Test (Vershchuere et al., 2010), are also problematic as utilised by Clean Protocol™. Physiological changes, oculomotor measures (e.g., eye movements, blinks or duration of focus) and response-time differences can be induced and captured, but the underlying mechanisms behind these changes are poorly understood (Petróczi et al., 2015a; 2015b; Petróczi et al., 2013; Verschuere et al., 2009). Unless any other explanations for the changes observed during these assessments can be ruled out, making causal inferences regarding deception is unjustified (Leonetti, 2017). Moral cognition (e.g., thoughts about cheating by doping) presents further complication, because cultural and linguistic variables are not controlled (Moll et al., 2005). In summary, deception detection technologies present serious practical, regulatory and ethical challenges (Iacono & Ben-Shakhar, 2019; NRC, 2003; Shamoo, 2010) to the Clean Protocol™.

Fourthly, their stated sharing of biological data from the Athlete Biological Passport (ABP) is problematic for two reasons: (1) only the haematological variables of the ABP are available to athletes, not the full passport profile and (2) ABP parameters cannot be interpreted without understanding the context of sample collection. Factors such as high altitude training, exercise, dehydration, iron supplementation, menstrual cycle, illness, sample storage and transportation

conditions can alter ABP parameters (e.g., Amante et al., 2019; Coffman et al., 2020; Miller et al., 2019; Mullen et al., 2020; Voss et al., 2020; Robinson et al., 2011; 2016). Expert knowledge and proficiency have a bearing on interpretation of ABP data too (Schumacher & d'Onofrio, 2012). The absence of anonymity in review introduces the potential for reviewer bias, which is precisely the reason why in the ABP the expert reviewing the passport does not know the identity of the athlete. It is true that the current markers of both the haematological and steroid modules of the ABP can be used to develop target testing when the profile of a specific athlete is particularly abnormal (Robinson et al., 2017; Zorzoli et al., 2014) and - in conjunction with other data - have been linked to or been the basis of sanctions (Faiss et al., 2019). Nevertheless, the interpretation of the ABP data may facilitate a range of non-doping explanations for the observed biomarker values. In the present regime athletes are given the opportunity to provide explanations after being notified of adverse passport findings. The validity of explanations arising from Clean Protocol^{TM} is limited to the context of ABP sample collection and cannot be generalised from.

Furthermore, the absence of evidence of doping manipulation in an ABP cannot, on its own, confer clean status. When considering blood doping, a comparison of ABP-driven sanctions to population prevalence estimates (e.g., Faiss et al., 2020; Sottas et al., 2011) suggests that the present system produces a large number of false negative results. In every analytical approach, in order to increase the specificity of a result (to avoid false positives), there is always a price to pay in term of sensitivity. This is appropriate in a disciplinary context, in which the prosecuting authority's primary concern must be to avoid sanctioning the 'innocent'. In addition, whilst the ABP is longitudinal in nature, it does not provide continuous coverage of the athlete's biomarker values, only a snapshot of biomarker values at the time of data collection. Unless an athlete is sampled at a continuous rate, it would be impossible to conclude whether an athlete is truly clean or not. Moreover, ABP data can also be used to aid doping practices thus making large sets of personalised ABP data available to third party or making the data publicly available might have the unintended consequence of aiding doping which is mitigated by sharing partial ABP data and delayed data disclosure (Devriendt et al., 2018). Because of the delayed disclosure, athletes sharing their ABP data as per the Clean Protocol^{TM} reflects the past, not the present status.

Fifthly, there are several ethical concerns with the Clean Protocol^{TM}. In the 1980s, scholars had already highlighted the coercive effect of drug use in sport (Murray, 1983). If drug use is

widespread, and if drug use is believed to enhance performance, such use can have destructive coercive effects. There is a parallel logic with the Clean Protocol™. If the use of tools such as the Clean Protocol™ is taken up among sponsors, commercial event organisers and athletes, those who do not wish to engage in this practice may unwittingly become suspects of doping. In fact, if any protocol becomes a new norm, a kind of expected 'label' to have, suspicions fall on those without the putatively approved 'label'. This coercive pressure will extend to medical data in/directly derived from either the ABP or Therapeutic Use Exemption Certificates. This would be in tension with medical professionals' commitment to (athlete) patient confidentiality (Cox et al., 2017).

A further ethical concern relates to the potential for misuse of athletes' data'. As is evident from what is said above, the Clean Protocol™ intends to utilise methods and resultant data outside the intended and validated purpose (e.g., psychometric assessment), without the critically important context (e.g., ABP data) and without any prior testing or validation of the method to doping (e.g., oculomotor deception detection). The logic of science is not to prove hypotheses but to examine whether a hypothesis can stand up to the toughest possible attempts of falsification (Popper, 1963). Thus, in anti-doping research the idea cannot be to *prove* that athletes are clean, but to test whether the hypothesis of negative or positive controls stands up to the highest standards of critical scrutiny. Concepts such as the Clean Protocol™ fail on both ethical and scientific grounds.

Sixthly, the interplay between the Clean Protocol™ and the World Anti-Doping Programme legal framework requires close scrutiny. The Clean Protocol™ website claims that it is "designed so that there is no reason why a clean athlete would not take the Clean Protocol™". The following claims are made: "no risk for clean athletes"; "significant benefits and no greater detriment to athletes". On the other hand, the Clean Protocol™ claims to be working hand-in-hand with anti-doping organisations in various, unspecified ways. They assert "If that [failing the Clean Protocol™ tests] led the World Clean Sport Organisation (WCSO) to believe the Clean Protocol™ had been breached then those findings would be shared with other anti-doping agencies for follow up action". Precisely which anti-doping agencies would follow up is unspecified, and so critical questions concerning legitimate authority, sanctioning powers and data sharing agreements are elided. By contrast, the WADA Code operates such that the burden of proof is on anti-doping organisations to establish Anti-Doping Rule Violation (ADRV). Thus, at least until a positive test (an 'adverse analytical finding') is reported from a

doping control sample (or there is other tangible evidence of an ADRV), the default assumption is that all athletes are 'clean'. By implying that athletes must proactively demonstrate that they are 'clean', the Clean Protocol™ may generate apparent reputational credit, but from a legal perspective provides athletes with no more than they are already guaranteed.

The concept of 'clean athlete' that Clean Protocol™ promises to certify has no basis in the WADC and eludes legal definition (Viret, 2020a). Reliance on psychometric testing or signing commitments (the "Clean Contract"), for example, presupposes that the clean athlete is an athlete who is not deliberately engaging in 'doping'. This, however, does not fit in well with the current regulation, under which ADRVs occur when an athlete is found to have, objectively, a prohibited substance in their sample or when there is sufficient evidence that a prohibited substance or method was used (Viret, 2020b). Any legally binding statement that athletes could volunteer that they are 'not doping' is problematic, given that the WADC relies on strict liability for ADRVs and presumed fault for disciplinary sanctions. The Clean Protocol™ informs athletes that they should submit "if you are 100% confident that you will not dope yourself or others and will abide by the rules of the sport and the WADA Code". This is something that no athlete is able to guarantee under the current regulatory framework, and implying otherwise is misleading and potentially damaging for the athlete. The suggestion in item 8 of the Clean Protocol™ that athletes may agree to sign a statement that may come under sanction of perjury and possible criminal consequences in some jurisdictions appears of particular concern in this regard.

The Clean Protocol™ states that, even where the athlete is facing sanctions owing to inadvertent or third party induced doping, the protocol "could be very helpful information to assist with sentencing" in their defence. This unprecedented assertion plays to the idea that athletes could produce their Clean Protocol™ data to prove no (significant) fault, and thus avoid/reduce an otherwise applicable sanction. It is highly questionable whether such a promise would be acceptable to any disciplinary panels, let alone the Court of Arbitration for Sport (CAS), which is sports' final court of appeal.

Given the issues that we point out with respect to the validation of the techniques used in the Clean Protocol™, it is questionable how much evidentiary value panels would assign to this type of evidence. Previously faced with lie detector evaluations, CAS panels have been reluctant to assign probative value, beyond the status of a party declaration (e.g., CAS

2016/A/4534, Villanueva v. FINA, award of 16 March 2017). As already highlighted in connection with lie detector evidence (Rigozzi & Quinn, 2014; Viret, 2016), the collateral risk of, over time, making non-participating athletes the object of suspicion for their mere refusal to subject themselves to the protocol is more credible than the hypothetical benefit asserted.

In order to support prosecution, proof of an ADRV rests on the anti-doping organisation, to the standard of comfortable satisfaction (Article 3.1 of the WADA Code). This standard is higher than the balance of probability standard that the defence must meet (Ioannidis, 2015), and the WADA Code and CAS jurisprudence (Ioannidis 2016; 2017), as well as national case law, clearly instruct that the more serious the allegation, the stronger the evidence required (CAS 2004/O/645 USADA v. Montgomery; Hornal v Neuberger Products Ltd [1957] 1 QB 247). Creators of the Clean Protocol™ are not able to provide valid scientific evidences to support their "alternative non-analytical approach" to anti-doping. It is highly unlikely that a "suspicious profile" would be recognised by CAS as sufficiently reliable circumstantial evidence. The defence could easily undermine the scientific validity of the tools and thus their probative value.

Seventhly, in addition to the ethical concerns above, due legal consideration must be given to privacy (Macgregor et al., 2013). In addition to 'whereabouts' and the timeframe of professional contracts, much of the data collected from the athletes would qualify as 'sensitive' health data (e.g., ABP data, injuries and TUE) which enjoys special protection under data protection laws, and specifically, in the European context, under the General Data Protection Regulation (GDPR). Though processing of all data can generally be legitimised through consent, such consent needs to be informed, explicit and free, which includes the right to withdraw consent at any time. The problematic character of consent in this context is a commonplace (Viret, 2016, 2019). Clean Protocol™ advocates for the protocol to become part of the anti-doping arsenal, including its use by teams, sponsors or event organisers, and that suspicious findings may be communicated to anti-doping organisations. If the Clean Protocol™ certification were to be endorsed or even implemented by sports organisations within their anti-doping programs (so that athletes who do not submit to the Clean Protocol™ start appearing suspicious *a priori*) considerable issues arise regarding the validity of the consent at hand. Clean Protocol™ does not explain its protections of data subject rights in this highly sensitive legal landscape. Even if we assume that data protection is detailed in the Clean Contract (Level 1 of the Clean Protocol™), discrepancies between national laws may lead to

evidential differentiations (i.e., the Clean Protocol™ may be able to operate lawfully in some jurisdictions and not in others), creating unequal treatment among athletes and offending the main premise of the WADC (WADA 2021a), which is global harmonisation.

Eighthly, the proposed 'Whoabouts™' system by which athletes would be required to (en)list their support network, supply information on injuries, chronic illnesses and Therapeutic Use Exemptions as well as sponsorship contacts details, collectively introduces a higher level of surveillance. The existing WADA whereabouts system is not without criticism (e.g., Møller, 2011) yet can be justified on the need for out-of-competition testing (MacGregor et al., 2013), and has been upheld by the European Court of Human Rights (ECHR Decision, 18 Jan 2018, FNASS et al. v France, n° 48151/11 et 77769/13). The proposed 'Whoabouts™' also requires the athletes' entourage to subject themselves at least to part of the Clean Protocol™ tests (including various attitudinal measures). Psychological research has demonstrated that the entourage (which may include coaches, parents, physiotherapists and physicians) influences motivational climate (Petróczi & Aidman, 2009; Ntoumanis et al., 2017) and moral disengagement (Boardley & Kavussanu, 2008), which are two important factors in doping. Sociological research also shows that the entourage has a strong influence on deviance processes (Aubel & Ohl, 2014; Hughes & Coakley, 1991) and that sport organisations play direct and indirect roles in doping (Houlihan, 2002).

Nevertheless, claiming that Clean Protocol™ can 'achieve the transparency required for clean sport' by disclosing the name of their entourage is, at the best, redundant with the article 2.10 of the 2015 WADC on 'Prohibited Association'. The 'Whoabout™' gives the illusion that naming people who supports the athlete in training and competition, if done honestly, is enough to be able to assess the role of complex interactions between an athlete and its entourage. Such lists can be used to inform targeted testing (for which the organisation behind Clean Protocol™ has no authority), but its usefulness to be an effective prevention tool is limited and its application may lead to breaches of data protection regulation. At the very least, the 'Whoabout™' system requires athletes to communicate personal data concerning third parties, regardless of their consent, making this requirement illegal and unethical. In addition, it is unclear how any data provided could be verified without the involvement of national law enforcement authorities, which would make any meaningful use either impracticable or disproportionately intrusive.

Ninthly, setting aside the fact that absence (of doping or rule breaking) cannot be proven, only the presence of such behaviour, the rule of parsimony for any attempt to find evidence for 'guilt' should be upheld. Therefore, Clean Protocol™ should demonstrate that the proposed number and combination of indicators listed are sufficient and absolutely necessary to detect dopers.

Furthermore, the lack of consideration of anti-doping education is concerning. The Athletes' Anti-Doping Rights Act (WADA, 2020) states that "*making sure athletes have rights, that athletes are aware of those rights, and can exercise those rights is vital to the success of clean sport*" (p2). Article 7 of this Act include Right to Education: "*Athletes have the right to receive anti-doping Education and information from Anti-Doping Organizations. (Code Article 18, International Standard for Education)*" (WADA, 2021b, p6). Fostering a clean sport environment needs more than education about the rules and responsibilities (Backhouse, 2015) but minimally, Clean Protocol™ should specify what educational provisions support their would-be clean sport authentication system.

Whilst this commentary is primarily concerned with Clean Protocol™, the issue of certification of 'clean athlete' status is not unique to them. It is also seen in programmes such as the Mouvement Pour un Cyclisme Crédible (MPCC; http://mpcc.fr/index.php/en/), QUARTZ (www.quartzprogram.org) and Clean Sport Collective (www.cleansport.org). These programmes vary considerably in their approach. MPCC, created to advocate clean cycling, tries to involve teams and riders, on a voluntary basis, to change the image and culture of cycling (Plassard et al., 2020). Clean Sport Collective also relies on an ethical commitment and the wish to protect clean athletes. QUARTZ is more ambivalent, as some of its statements are close to Clean Protocol™. Thus, these programmes range from asking athletes to make a voluntary pledge (i.e., Clean Sport Collective, MPCC) to sharing their personal records from the WADA Anti-Doping Administration & Management System and making biological data from doping control tests publicly available (i.e., QUARTZ). We welcome programmes that encourage athletes to openly declare their commitment to clean sport – as seen with the Clean Sport Collective – but we take issue with programmes that lack transparency and scientific scrutiny to prevent potential misuse of assessment tools for intents other than their intended and validated purpose, and we openly challenge the flawed promise of verifying 'clean athlete status'. Moreover, we call for transparent and rigorous scientific scrutiny via peer-review for

alternative anti-doping systems. To make constructive progress in the common goal of clean sport for all stakeholders, we make the following recommendations:

1. *Transparent and evidence-informed programmes*: To facilitate proper use of science, and gain credibility among anti-doping stakeholders, we encourage custodians of anti-doping systems to:

   a. devise a rigorous and ethically approved study protocol to empirically validate their proposed approach and combination of measurements, via publication as a *research protocol* before data collection commences;

   b. publish the *results* of this study or series of studies in peer-reviewed scientific journal/s which would constitute an essential prerequisite for upholding the clean athlete proof claims, and clarify the rate of false positives and false negatives; and

   c. via the established mechanism of identifiable authorship, the scientific team behind suggestions for any new anti-doping measures should take public responsibility for the claims they make.

   This level of transparency and scientific scrutiny is fundamental before implementing a system that can have serious consequences for the livelihoods of athletes and their entourage and impact their personal lives, as well as their rights.

2. *Policy guidance on the use of psychometric tests in anti-doping*: An argument for establishing a robust and peer-reviewed collection of valid and reliable instruments in anti-doping has been made (Petróczi et al, 2015a). With the increased demands on anti-doping organisations and sport federations to evaluate the effectiveness of anti-doping education programmes, there is an even more compelling reason for a curated set of psychometric assessment with guidance for proper implementation.

3. *Legal assessment of the tools proposed*: Any programme that advertises itself to athletes as a way of showing their commitment to 'clean sport' and involves collecting data, including sensitive data, must undergo assessment for its compliance with data protection laws and privacy principles. If it is to offer athletes any added value, it must also be designed to be coherent with the mandatory WADC framework, when it comes to the definition of 'doping' or to the proof regime. Athletes should not be lulled into a false sense of security and be led to believe that participation could avert anti-doping

proceedings or give them better cards in such proceedings. Tools allowing athlete to demonstrate diligence in complying with anti-doping regulations (e.g., appropriate medication or supplement check procedures) would appear legally much more acceptable and should be given preference over the unrealistic goal of trying to prove clean status.

4. *Collaboration among stakeholders and regulatory bodies to address integrity issues in sport collectively:* If 'clean sport' is conceptualised as a key rampart of the broader concept of sport integrity (Cleret et al, 2015), addressing forms of cheating other than doping is not only logical but desirable. If 'clean sport' is important because it is a critical product attribute for the general public, sponsors, investors and private event organisers, its scope ought not to stop at doping but should also include broader integrity issues such as age manipulation, tampering with equipment, classification fraud in para-sport, and manipulating performance for betting purposes. Ultimately, organised doping (e.g., trafficking, supplying and/or administering doping substances, or aiding athletes to avoid testing or detection) has been connected to other forms of infringements (e.g., performance or competition manipulation or other forms of cheating). Recognising this interdependence, some sport (e.g., athletics and tennis) and countries (e.g., Australia, Canada, UK) have established integrity units.

In closing, we understand that the mere existence of Clean Protocol™ and similar initiatives signals that athletes who compete within the rules and spirit of clean sport, due to a loss of confidence in sports, are desperate to show their clean status. Clean Protocol™ presenting itself as an "organisation providing data driven services to improve the credibility of sport", seems to fit well with the "Olympic Agenda 2020" that places credibility as IOC's main priority for the sake of the athletes. Credibility is a central component of trust (Manning, 2000). Even though the stated intention of Clean Protocol™ is to restore trust in sport, we believe that it is more likely to instil distrust among athletes. Athletes who stay away from the Clean Protocol™ for reasons independent of doping, such as concern about publicly sharing personal health information or contract details, can lose trust of the audience or undeservedly suffer a bad image, and the dubious "clean labelling" could create discrimination in access to work.

Unfortunately, sport organisations' ambivalent moral commitment (Henne, 2014), doubts concerning WADA's effectiveness (Houlihan & Hanstad, 2019; Hoberman, 2013; Wagner & Pedersen, 2014), negative outcomes of anti-doping (Read et al., 2018) and stakeholder misconduct (Waddington & Smith, 2009) undermined the credibility of anti-doping. Owing to

the limitations in doping testing, it is impossible to give failproof reassurance to the public that all athletes they watch and cheer for are clean; and thus any alternative detection protocol promises this is promoting falsehood. As for other opaque and complex contexts, Clean Protocol[TM] stages itself as a "judgment device" (Karpik, 2010), to be able to guide the audience by claiming to identify clean athletes. To be efficient, a judgment device must be transparent and trustworthy.

Despite the claims made by Clean Protocol[TM], there is no way scientifically to *prove* that one has *not* doped, only that one is or seeks to be anti-doping rule compliant. The mere absence of a positive test for doping does not constitute *proof* of anything. The current application of the principles of strict liability and presumed fault, and the process by which WADA seeks to effectively prosecute alleged offences, have a strong legal basis, and endorse athletes' personal responsibility. We believe that these initiatives must be underpinned by more credible goals and lawful foundation, such as providing athletes with the means to show due diligence in compliance with anti-doping regulations. Notably, this mandates knowledge of the Prohibited List, awareness of possible sources for inadvertent doping (contaminated and adulterated supplements, etc.), education about how to mitigate the risks in this respect, and about what other conducts are prohibited under the WADA Code (whereabouts failures, refusal to submit to testing, etc.). Underpinning personal responsibility, athletes must be educated in relation to all relevant aspects anti-doping (WADA, 2020b). We believe that athletes and other users must also be cognisant of the details and potentials risks associated with any alternative testing or certification protocol they may voluntarily sign-up to.

References

Agosta, S., & Sartori, G. (2013). The autobiographical IAT: a review. *Frontiers in Psychology, 4*, 519. https://doi.org/10.3389/fpsyg.2013.00519

Amante, E., Pruner, S., Alladio, E., Salomone, A., Vincenti, M., & Bro, R. (2019). Multivariate interpretation of the urinary steroid profile and training-induced modifications. The case study of a Marathon runner. *Drug Testing and Analysis*, 11(10), 1556-1565. https://doi: 10.1002/dta.2676

Aubel, O., & Ohl, F. (2014). An alternative approach to the prevention of doping in cycling. *International Journal of Drug Policy*, 25(6), 1094–1102. https://doi.org/10.1016/j.drugpo.2014.08.010

Backhouse, S.H. (2015). *Anti-Doping Education for Athletes.* Routledge Handbook of Drugs in Sport. Routledge, London.

Backhouse, S.H, Griffiths, C, & McKenna, J (2018). Tackling doping in sport: a call to take action on the *dopogenic* environment. *British Journal of Sports Medicine, 52,* 1485-1486. https://doi.org/10.1136/bjsports-2016-097169

Ben-Shakhar, G. (2012). Current research and potential applications of the concealed information test: an overview. *Frontiers in Psychology*, 3, 342. https://doi.org/10.3389/fpsyg.2012.00342

Berry, D.A. (2008). The science of doping. *Nature, 454*(7205), 692-693. https://doi.org/10.1038/454692a

Blank, C., Kopp, M., Niedermeier, M., Schnitzer, M., & Schobersberger, W. (2016). Predictors of doping intentions, susceptibility, and behaviour of elite athletes: a meta-analytic review. *SpringerPlus*, 5(1), 1333. https://doi.org/10.1186/s40064-016-3000-0

Boardley, I. D., & Kavussanu, M. (2008). The moral disengagement in sport scale–short. *Journal of Sports Sciences*, 26(14), 1507-1517. https://doi.org/10.1080/02640410802315054

Cleret, L., McNamee, M., & Page, S. (2015). 'Sports integrity' needs sports ethics (and sports philosophers and sports ethicists too). *Sport, Ethics and Philosophy*, 9(1), 1-5. https://doi.org/10.1080/17511321.2015.1049015

Coffman, K. E., Mitchell, K. M., Salgado, R. M., Miller, G. D., Kenefick, R. W., & Cheuvront, S. N. (2020). Potential for dehydration to impact the athlete biological passport. [published online ahead of print, 2020 Apr 20]. *Drug Testing and Analysis*. 10.1002/dta.2811. doi:10.1002/dta.2811

Cook AE, Hacker DJ, Webb AK, Osher D, Kristjansson SD, Woltz DJ, Kircher JC. Lyin' eyes: ocular-motor measures of reading reveal deception. *Journal of Experimental Psychology: Applied*. 2012 Sep;18(3), 301-313. https://doi.org/10.1037/a0028307

Cox, L., Bloodworth, A., & McNamee, M. (2017). Olympic doping, transparency, and the therapeutic exemption process. *Diagoras: International Academic Journal on Olympic Studies, 1*, 55-74.

Crowne, D. P., & Marlowe, D. (1960). A new scale of social desirability independent of psychopathology. *Journal of Consulting Psychology, 24*(4), 349-354. https://doi.org/10.1037/h0047358

Devriendt, T., Chokoshvili, D., Favaretto, M., & Borry, P. (2018). Do athletes have a right to access data in their Athlete Biological Passport?. *Drug Testing and Analysis, 10*(5), 802-806. https://doi: 10.1002/dta.2380

Dimeo, P. (2016). The myth of clean sport and its unintended consequences. *Performance Enhancement & Health*, 4(3–4), 103–110. https://doi.org/10.1016/j.peh.2016.04.001

Faiss, R., Saugy, J. J., & Saugy, M. O. (2019). Fighting doping in elite sports: Blood for all tests!. *Frontiers in Sports and Active Living, 1*, 30. https://doi.org/10.3389/fspor.2019.00030

Faiss, R., Saugy, J., Zollinger, A., Robinson, N., Schuetz, F., Saugy, M., & Garnier, P. Y. (2020). Prevalence estimate of blood doping in elite track and field athletes during two major international events. *Frontiers in Physiology*, 11, 160. https://doi.org/10.3389/fphys.2020.00160

Gamer, M., & Pertzov, Y. (2018). Detecting concealed knowledge from ocular responses. In J.P. Rosenfeld (Ed.) *Detecting concealed information and deception* (pp. 169-186). Academic Press.

Gucciardi, D. F., Jalleh, G., & Donovan, R. J. (2010). Does social desirability influence the relationship between doping attitudes and doping susceptibility in athletes? *Psychology of Sport and Exercise*, *11*(6), 479-486. https://doi.org/10.1016/j.psychsport.2010.06.002

Henne, K. (2014). The Emergence of moral technopreneurialism in sport: Techniques in anti-doping regulation, 1966–1976. *The International Journal of the History of Sport*, *31*(8), 884–901. https://doi.org/10.1080/09523367.2013.817990

Hoberman, J. (2013). How much do we (really) know about anti-doping education. *Performance Enhancement & Health*, *2*(4), 137–143. https://doi.org/10.1016/j.peh.2014.09.002

Holden R.R., & Fekken G.C. (2017) Balanced Inventory of Desirable Responding. In: Zeigler-Hill V., Shackelford T. (eds) *Encyclopedia of Personality and Individual Differences.* Springer, Cham. https://doi.org/10.1007/978-3-319-28099-8_3-1

Houlihan, B. (2002). *Dying to win: Doping in sport and the development of anti-doping policy*. Council of Europe Pub.

Houlihan, B., & Hanstad, D. V. (2019). The effectiveness of the World Anti-Doping Agency: Developing a framework for analysis. *International Journal of Sport Policy and Politics*, *11*(2), 203–217. https://doi.org/10.1080/19406940.2018.1534257

Hughes, R., & Coakley, J. (1991). Positive deviance among athletes: The implications of overconformity to the sport ethic. *Sociology of Sport Journal*, *8*(4), 307–325. https://doi.org/10.1123/ssj.8.4.307

Iacono, W. G., & Ben-Shakhar, G. (2019). Current status of forensic lie detection with the comparison question technique: An update of the 2003 National Academy of Sciences report on polygraph testing. *Law and Human Behavior, 43*(1), 86-98. https://doi.org/10.1037/lhb0000307

Ioannidis, G. (2015). "The concept of 'No Significant Fault' in anti-doping litigation", *World Sports Law Report*, June 2015, pp 6-8.

Ioannidis, G. (2016). The influence of common law traditions on the practice and procedure before the court of arbitration for sport (CAS). In *Yearbook of International Sports Arbitration 2015* (pp. 17-38). TMC Asser Press, The Hague.

Ioannidis, G. (2017). The criminalisation of doping in sport: The case for the prosecution. *World Sports Advocate*, 12-14. https://www.kingschambers.org.uk/assets/articles/Criminalisation%20July%202017%20PDF%2012-1423114.pdf Accessed 30/06/2020

Karpik, L. (2010). The economics of singularities. Princeton University Press, Princeton.

Leite, W.L., & Nazari, S. (2017) Marlowe-Crowne Social Desirability Scale. In: Zeigler-Hill V., Shackelford T. (eds) *Encyclopedia of Personality and Individual Differences*. Springer, Cham. https://doi.org/10.1007/978-3-319-28099-8_45-1

Leonetti, C. (2017). Abracadabra, hocus pocus, same song, different chorus: The newest iteration of the science of lie detection. *Richmond Journal of Law & Technology, 24*, 1-35.

Loland, S. (2018). Performance-enhancing drugs, sport, and the ideal of natural athletic performance. *The American Journal of Bioethics, 18*(6), 8-15. https://doi.org/10.1080/15265161.2018.1459934

Loland, S., & McNamee, M. J. (2019). The 'spirit of sport', WADAs code review, and the search for an overlapping consensus. *International Journal of Sport Policy and Politics, 11*(2), 325-339. https://doi.org/10.1080/19406940.2019.1581646

MacGregor, O., Griffith, R., Ruggiu, D., & McNamee, M. (2013). Anti-doping, purported rights to privacy and WADA's whereabouts requirements: A legal analysis. *FairPlay, Revista de Filosofía, Ética y Derecho del Deporte*, *1*(2), 13-38.

Maennig, W. (2014). Inefficiency of the anti-doping system: Cost reduction proposals. *Substance Use & Misuse, 49*(9), 1201-1205. https://doi.org/10.3109/10826084.2014.912065

Manning, P. (2000). Credibility, agency, and the interaction order. *Symbolic Interaction*, 23(3), 283–297. https://doi.org/10.1525/si.2000.23.3.283

Miller, G. D., Teramoto, M., Smeal, S. J., Cushman, D., & Eichner, D. (2019). Assessing serum albumin concentration following exercise-induced fluid shifts in the context of the athlete biological passport. *Drug Testing and Analysis*, 11(6), 782-791. https://doi.org/10.1002/dta.2571

Moll, J., Zahn, R., de Oliveira-Souza, R., Krueger, F., & Grafman, J. (2005). The neural basis of human moral cognition. *Nature Reviews Neuroscience, 6*(10), 799-809. https://doi.org/10.1038/nrn1768

Møller, V. (2011). One step too far–about WADA's whereabouts rule. *International Journal of Sport Policy and Politics*, 3(2), 177-190. https://doi.org/10.1080/19406940.2011.579145

Mullen, J., Bækken, L., Bergström, H., Björkhem Bergman, L., Ericsson, M., & Ekström, L. (2020). Fluctuations of hematological Athlete Biological Passport biomarkers in relation to the menstrual cycle. *Drug Testing and Analysis*, 1-12. https://doi.org/10.1002/dta.2873

Murray, T.H. (1983). The Coercive power of drugs in sport. *The Hastings Center Report, 4*, 24-30.

National Research Council (NRC). (2003). *The Polygraph and Lie Detection*. Consensus Study Report. Washington, D.C.: The National Academies Press.

Ntoumanis, N., Ng, J. Y., Barkoukis, V., & Backhouse, S. (2014). Personal and psychosocial predictors of doping use in physical activity settings: a meta-analysis. *Sports Medicine*, 44(11), 1603-1624. https://doi.org/10.1007/s40279-014-0240-4

Ntoumanis, N., Barkoukis, V., Gucciardi, D.F., & Chan, D. (2017). Linking coach interpersonal style with Athlete doping intentions and doping use: A prospective study. *Journal of Sport and Exercise Psychology, 39*, 188–98. https://doi.org/10.1123/jsep.2016-0243

Paulus, D. L. (1989). *Balanced Inventory of Desirable Responding (BIDR-6)*. Vancouver, BC: University of Canada.

Paulhus, D.L. (2017) Socially Desirable Responding on Self-Reports. In: Zeigler-Hill V., Shackelford T. (eds) *Encyclopedia of Personality and Individual Differences.* Springer, Cham. https://doi.org/10.1007/978-3-319-28099-8_1349-1

Perinelli, E., & Gremigni, P. (2016). Use of social desirability scales in clinical psychology: A systematic review. *Journal of Clinical Psychology, 72*(6), 534-551. https://doi.org/10.1002/jclp.22284

Petróczi, A., Aidman, E.V., Hussain, I., Deshmukh, N., Nepusz, T., Uvacsek, M., Tóth, M., Barker, J., & Naughton, D.P. (2010). Virtue or pretense?. Looking behind self-declared innocence in doping. *PloS One*, 5, 5(5), e10457. https://doi.org/10.1371/journal.pone.0010457

Petróczi, A., Uvacsek, M., Nepusz, T., Deshmukh, N., Shah, I., Aidman, E.V., Barker, J., Tóth, M., & Naughton, D.P. (2011). Incongruence in doping related attitudes, beliefs and opinions in the context of discordant behavioural data: in which measure do we trust?. *PLoS One*, 26, 6(4), e18804. https://doi.org/10.1371/journal.pone.0018804

Petróczi, A. (2013). The doping mindset–Part II: Potentials and pitfalls in capturing athletes' doping attitudes with response-time methodology. *Performance Enhancement & Health, 2*(4), 164-181. https://doi.org/10.1016/j.peh.2014.08.003

Petróczi, A., & Aidman, E. (2009). Measuring explicit attitude toward doping: Review of the psychometric properties of the Performance Enhancement Attitude Scale. *Psychology of Sport and Exercise*, 10(3), 390-396. https://doi.org/10.1016/j.psychsport.2008.11.001

Petróczi, A., Backhouse, S.H., Barkoukis, V., Brand, R., Elbe, A.M., Lazuras, L., & Lucidi, F. (2015a). A call for policy guidance on psychometric testing in doping control in sport. *International Journal of Drug Policy*, *26*(11), 1130-1139. https://doi.org/10.1016/j.drugpo.2015.04.022

Petróczi, A., Backhouse, S.H., Barkoukis, V., Brand, R., Elbe, A.M., Lazuras, L., & Lucidi, F. (2015b). A matter of mind-set in the interpretation of forensic application. *International Journal of Drug Policy*, *26*(11), 1142-1143. https://doi.org/10.1016/j.drugpo.2015.06.007

Pielke, R. (2018). Assessing doping prevalence is possible. So what are we waiting for?. *Sports Medicine, 48*(1), 207-209. https://doi.org/10.1007/s40279-017-0792-1

Pielke Jr R., & Boye, E. (2019). Scientific integrity and anti-doping regulation. *International Journal of Sport Policy and Politics, 11*(2), 295-313. https://doi.org/10.1080/19406940.2019.1596968

Pitsch, W. (2009). "The science of doping" revisited: Fallacies of the current anti-doping regime. *European Journal of Sport Science, 9*(2), 87-95. https://doi.org/10.1080/17461390802702309

Pitsiladis, Y.P., Abatzis-Papadopoulos, M., Ali, N., Aggeloudis, S., Atkinson, C., Constandache, B., Ganus, Y., Geladas, N., Giakoumakis, S.I., Güner, R., … & Howman, D. (2019). The Olympia Declaration. *Current Sports Medicine Reports*, *18*(12), 448-451. https://doi.org/10.1249/JSR.0000000000000660

Plassard, F., Ohl, F., & Schoch, L. (2020). Cycling alone: Team Sky's difficult quest for credibility during the 2015 Tour de France. *International Review for the Sociology of Sport*. https://doi.org/10.1177/1012690220904269

Popper, K. R. (1963). Science as falsification. *Conjectures and Refutations, 1*, 33-39.

Read, D., Skinner, J., Lock, D., & Houlihan, B. (2018). Legitimacy driven change at the World Anti-Doping Agency. *International Journal of Sport Policy and Politics*, 1–13. https://doi.org/10.1080/19406940.2018.1544580

Rigozzi, A., & Quinn, B. (2014). Evidentiary issues before CAS, in Bernasconi M (Ed.) *International Sports Law and Jurisprudence of the CAS*, (pp 1-54). Berne.

Robinson, N., Giraud, S., Schumacher, Y. O., & Saugy, M. (2016). Influence of transport and time on blood variables commonly measured for the athlete biological passport. *Drug Testing and Analysis*, *8*(2), 199-207. https://doi.org/10.1002/dta.1804

Robinson, N., Sottas, P. E., & Schumacher, Y. O. (2017). The Athlete Biological Passport: How to personalize anti-doping testing across an athlete's career?. In O. Rabin, Y. Pitsiladis (Eds) *Acute topics in anti-doping* (Vol. 62, pp. 107-118). Karger Publishers.

Robinson, N., Sottas, P. E., Pottgiesser, T., Schumacher, Y. O., & Saugy, M. (2011). Stability and robustness of blood variables in an antidoping context. *International Journal of Laboratory Hematology*, *33*(2), 146-153. https://doi.org/10.1111/j.1751-553X.2010.01256.x

Schumacher, O. Y., & d′ Onofrio, G. (2012). Scientific expertise and the Athlete Biological Passport: 3 years of experience. *Clinical Chemistry*, *58*(6), 979-985. https://doi.org/10.1373/clinchem.2012.183061

Shamoo, A. E. (2010). Ethical and regulatory challenges in psychophysiology and neuroscience-based technology for determining behavior. *Accountability in Research, 17*(1), 8-29. https://doi.org/10.1080/08989620903520271

Sottas, P. E., Robinson, N., Fischetto, G., Dollé, G., Alonso, J. M., & Saugy, M. (2011). Prevalence of blood doping in samples collected from elite track and field athletes. *Clinical Chemistry*, *57*(5), 762-769. https://doi.org/10.1373/clinchem.2010.156067

Stoeber, J. (1999). Die Soziale-Erwünschtheits-Skala-17 (SES-17): Entwicklung und erste Befunde zu Reliabilität und Validität [The Social Desirability Scale-17 (SDS-17): Development and first findings on reliability and validity]. *Diagnostica, 45* (4), 173-177.

Vershchuere B, Crombez G, Degroote T, Rosseel Y. (2010). Detecting concealed information with reaction times: validity and comparison with the polygraph. *Applied Cognitive Psychology, 7*, 99-1002. https://doi.org/10.1002/acp.1601

Verschuere, B., Prati, V., & Houwer, J. D. (2009). Cheating the lie detector: Faking in the autobiographical Implicit Association Test. *Psychological Science, 20*(4), 410-413. https://doi.org/10.1111/j.1467-9280.2009.02308.x

Viret, M. (2016). Scientific Evidence in CAS Arbitration for Doping Disputes. In *Evidence in Anti-Doping at the Intersection of Science and Law* (pp 5 543-645), T.M.C Asser Press / Springer.

Viret, M. (2019). How data protection crystallises key legal challenges in anti-doping, *T.M.C Asser International Sports Law Blog*, 7 May 2019, https://www.asser.nl/SportsLaw/Blog/post/how-data-protection-crystallises-key-legal-challenges-in-anti-doping-by-marjolaine-viret accessed: 30/06/2020

Viret, M. (2020a). Using interdisciplinary tools to improve anti-doping: Utopia or necessity? *International Sports Law Journal*, *20*, 82-113. https://doi.org/10.1007/s40318-019-00161-8

Viret, M. (2020b). Prevalence for evidence-based doping regulation – A Lawyer's perspective. *Performance Enhancement & Health*, https://doi.org/10.1016/j.peh.2020.100167

Voss, S.C, Al-Hamad, K, Samsam, W, Cherif, A, Georgakopoulos, C, Al Maadheed, M, Balanos, G, Lucas, S, Sottas, P.E, Wilson, M, Townsend, N. (2020). A novel mixed living high training low intervention and the hematological module of the athlete biological passport. *Drug Testing and Analysis*, *12*(3), 323-30. https://doi.org/10.1002/dta.2723

WADA Athletes' Anti-Doping Rights Act (2020). https://www.wada-ama.org/en/resources/anti-doping-community/athletes-anti-doping-rights-act

WADA International Standard for Education (2021b). https://www.wada-ama.org/en/resources/the-code/2021-international-standard-for-education

WADA World Anti-Doping Code (2021a) https://www.wada-ama.org/en/resources/the-code/2021-world-anti-doping-code

Waddington, I., & Smith, A. (2009). *An Introduction to Drugs in Sport: Addicted to Winning?* Routledge.

Wagner, U., & Pedersen, K. M. (2014). The IOC and the doping issue—An institutional discursive approach to organizational identity construction. *Sport Management Review*, *17*(2), 160–173. https://doi.org/10.1016/j.smr.2013.05.001

Zorzoli, M., Pipe, A., Garnier, P. Y., Vouillamoz, M., & Dvorak, J. (2014). Practical experience with the implementation of an athlete's biological profile in athletics, cycling, football and swimming. *British Journal of Sports Medicine*, 48(10), 862-866. https://doi.org/10.1136/bjsports-2014-093567

Table 1: Levels of the Clean Protocol™ (based on: http://cleanprotocol.org/the-clean-protocol/how-it-works, accessed on 14/10/2020)

Type	Level	Description
Mandatory	The Clean Contract	Requires the athlete to make a contractual commitment to abide by the rules of the sport and to submit themselves to the Clean Protocol™.
	Whoabouts™	Requires the athlete to make full disclosure of all of the people he/she works with to achieve their sports performance. These include coaches, trainers, doctors, physiotherapists, sports scientists, team manager, training partners and family members (if they are involved in the athletes' training).
	Entourage	Requires the athlete's entourage to take the Clean Protocol™ and make the same commitment as the athlete.
	Biological data	Requires the athlete to publish his/her biological data that he/she is in possession of as a result of compliance with the biological passport or from their own testing from other sources.
	Intelligence	Requires the athlete to disclose information on event schedule, injuries, the use of supplements and any Therapeutic Use Exemptions to improve the "targeting of random testing under the Clean Protocol™".
	Psychometric testing	Requires the athlete (and entourage) to take a battery of psychometric assessments (e.g., doping attitude, moral disengagement, social desirability).
	Deception testing	Requires the athlete to take a deception / concealment of information test ('lie detection' test).
Optional	Legally binding statement	The athlete may be asked to execute a legally binding statement depending on their domicile and relevant jurisdiction.
	Functional Magnetic Resonance Imaging (FMRI)	The athlete may be asked to undertake an FMRI deception test measures brain activity by changes in the blood flow from the difference in brain activity associated with truth telling versus deception.