THE PERCEPTION OF LEGITIMACY OF ANTI-DOPING RULES AND ORGANIZATIONS AND ITS EFFECT ON ATHLETES' ATTITUDES AND BUY-IN TO ANTI-DOPING PROGRAMS

FINAL REPORT

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Preamble

This report was prepared for the World Anti-Doping Agency as the final report for the Social Science Grant awarded for Part 1 of this report. We added the empirical component (Part 2) in support for an IOC-funded work to establish and test a behavioural model for anti-doping support.

Summary: Legitimacy is the fundamental constituent of voluntary compliance with the law or with specific rules. From society's point of view, legitimacy is 1) a property of an authority, institution or social arrangement based on beliefs about the appropriateness and fairness of what these entities represent; and 2) a property of the rules and procedures in place to serve a specific goal and by which everyone involved is ought to comply. The social psychology approach to legitimacy places the emphasis on social norms (seeing perceived legitimacy as a results of the self-regulating dynamics in social groups), or perceptions and beliefs about the pillars on which legitimacy of a top-down regulation is justified. The legitimacy of anti-doping is built on the drive to preserve the integrity and spirit of sport to which doping is seen as being "fundamentally contrary". From the legal point of view, the legitimacy of anti-doping rules and procedures, which place considerable burden on the athletes, is determined by the soundness of the principles in whose name athletes are subjected to testing and sanctioning. Rules and organisations are in place to establish system level legitimacy of anti-doping. However, contrary to social- and legal system level approaches, preventive efforts target individual athletes, and individuals in the athlete's entourage. Therefore it is vital to understand how legitimacy of anti-doping is perceived by those who are affected.

To date, there is a considerable gap in the body of knowledge about doping behaviour regarding legitimacy. Yet, the significant growth and diversification in social science doping research produced a considerable amount of information and data on doping behaviour and its motivators and deterrents. Although the extant doping literature which clearly identifies legitimacy is scarce, but elements of anti-doping legitimacy appear in numerous accounts of social science doping research.

The aim of the WADA-funded study (Part 1) was to identify and extract this information in order to establish what is currently known and what is missing from anti-doping legitimacy. The project will 1) identify social cognitive variables and map the relationship between perception of legitimacy and motivation to comply through available literature on the psychological aspect of legitimacy; and 2) synthesise and triangulate the available knowledge and evidence on perceived legitimacy of anti-doping and anti-doping organisations through a systematic review of quantitative and qualitative studies published to date on doping.

Challenges to legitimacy research in general, and in applications to anti-doping revolves around conceptualising and measuring legitimacy. In addition, the unique element anti-doping legitimacy research lies in the multiple target populations (athletes, stakeholders and general public), each with conceivably different dimensions of anti-doling legitimacy. With this project, we will make the first step toward conceptualisation, operational definition and measurement of perceived anti-doping legitimacy by creating a conceptual map of perceived anti-doping legitimacy as a psychological construct.

Part 2 presents work by the research team that makes a step further in this road. With the help of our collaborative partners, we turned this conceptualisation into testable items of a psychometric scale that measures stakeholders' perceptions of anti-doping legitimacy.

Executive summary

Legitimacy of anti-doping measures are justified on different grounds. Proponents of the Olympic idealism sees anti-doping as necessary means to protect the values of sport, and justifies anti-doping on the public' desire for clean sport. Psychologists and educators are interested in the individual, and find support for anti-doping because - and as long as - athletes want to train and compete in a clean sport environment. The latter is driven by individually held values, motivations and/or concerns with little regard to what the public prefers.

The past two decades have witnessed a significant development of anti-doping testing, rules, and organisations. However, despite increased research attention and the establishment of institutional and legal level legitimacy, research examining athletes' perceptions of anti-doping legitimacy as received relatively little attention. Thus, this project aims to address this gap.

First, we present a systematic mapping review of research on athletes' perceived legitimacy of anti-doping rules and organisations and preliminary results from an empirical study aiming to develop and validate a theory-based psychometric tool to assess perceptions of anti-doping.

In this review, findings were categorised into three components of perceived legitimacy: just, appropriate, and proper. Athletes' perceived the anti-doping rules and organisations as being proper, their perceptions of a harmonized system and the overall effectiveness of this system limited perceived legitimacy. Athletes' perception of the legitimacy of the anti-doping rules and regulations is not linked to what the public desires, such as clean sport for entertainment. Rather, it is driven by the athletes' agreement on the need for doping control (anti-doping is '*doing the right thing*' to protect clean sport because clean sport is worth protecting) and their views on whether the existing anti-doping system is implemented fairly and effective (i.e., *doing anti-doping in a right way*), including being successful in protecting clean sport and athletes.

Next, we developed a scaled assessment of perceived anti-doping legitimacy. The systematic mapping review and prior small-scale studies formed the basis of this new psychometric measure. The first item pool (38 items) was administered to competitive athletes in Germany (n = 269), Greece (n = 187), Italy (n = 187) and Russia (n = 106) and tested alongside other cognate constructs (attitude, morality, trust, trustworthiness and expected obedience and intention, measured as likelihood of violating anti-doping rules. Through a series of data reduction techniques (principal component analysis, parallel analysis and item to total correlation), best items were identified and the number of items were reduced to 15, collective offering a good representation of the three legitimacy components (normative legitimacy, procedural legitimacy for fair process and fair outcome). The scale's internal consistency reliability was 0.96. In addition, the internal consistency reliability estimates for the three subscales – if used independently - were: α = 0.782 (shared norms underpinning anti-doping), α = 0.812 (for fair process) and α = 0.937 (for fair outcomes). We established construct validity of the ADoLP by determining both convergent and divergent validity. High positive correlation between ADoLP and a direct 3-item measure of perceived anti-doping legitimacy used is previous studies was found ($r = 0.87$, $p < 0.001$). Moderate to high positive correlations were found for subscales proper ($r = 0.76$, $p < 0.001$), fair ($r = 0.91$, $p < 0.001$), and effective ($r = 0.85$, $p < 0.001$) subscales, suggesting convergent validity of the ADoLP. As expected, correlation analysis found small and non-significant correlation with attitude to performance

enhancement ($r = -0.005$, $p > 0.05$), morality ($r = -0.119$, $p < 0.01$) and athlete trust in anti-doping organisations ($r = -0.201$, $p < 0.001$). Further research is warranted to explore competitive level, age and country differences on legitimacy perception.

The 15-item scale (ADoLP) was tested with 109 competitive UK athletes. We found that the 15-item ADoLP scale could possibly shortened further to 10-items and used as a unidimensional measure. Both versions showed good psychometric properties. Internal consistency coefficients were well above the 0.7 cutoff (Cronbach alpha=0.917 for the 15-item and 0.883 for the 10-item scales, respectively). Exploratory factor (principal component) analysis did not reproduce the three-subscale structure. Further research is warranted to explore the dimensionality of the scale, potentially with a two-subscale structure to differentiate between normative and procedural component. Significant positive correlation was found between perceived anti-doping legitimacy and anti-doping rule compliance self-efficacy, and its related constructs (personal experience, knowledge, attitude and perceived social expectations). There was no statistically significant difference in legitimacy perception by involvement, or anti-doping education although the latter showed slightly more positive perception of ani-doping legitimacy compared to those with no education. Significantly higher anti-doping knowledge was present among those athletes who have been doping tested which is likely a reflection on the level of sport involvement (and thus the likelihood of being tested) and not the testing procedure per se.

Perceived legitimacy is an important concept in anti-doping. Contrary to the common view, data from these studies (including the systematic mapping review) suggest that perceived anti-doping legitimacy does not impact behaviour (voluntary compliance by athletes) *per se*. Rather, it influences how athletes *feel about compliance* with anti-doping rules and regulations; and whether they actively support anti-doping.

Perception of anti-doping legitimacy can be assessed as a psychological construct. The newly developed ADoLP scale can contribute to advancing research into anti-doping, clean sport behaviour and can be a useful addition to the battery of measures to evaluate anti-doping education. Although further research is needed into the dimensionality of the scale, the ADoLP scale (all items together as unidimensional scale) appears to be a valid and reliable measure of perceived anti-doping legitimacy.

This work focused on athletes. Further work is warranted to explore perceived anti-doping legitimacy among athlete support personnel, officers of anti-doping organisations and sport federations, anti-doping researchers, even among the general public – although the ADoLP scale may not be a suitable tool for the latter because it assumes a considerable level of familiarity with details in how anti-doping works.

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Part 1: Concept mapping: literature review[1]

Introduction

Over the last decade the world of sport has witnessed some of the largest doping scandals in its history (Ingle, 2019). High-profile examples include Lance Armstrong and the USPS cycling team (USADA, 2019), the ban of the Russian Olympic team from the 2016 Summer Olympics in Rio de Janeiro requiring clean athletes to compete under a neutral flag (Duval, 2017), and the UK Parliamentary Committee for Digital, Media, Culture and Sport condemning Bradley Wiggins and Team Sky in 2018 for misusing the Therapeutic Use Exemption (TUE) system (Digital, Culture, Media and Sport Committee, 2018).

Adding to the complexity of the doping problem, anti-doping is not a singular strategy but a multifaceted system. Elements of this anti-doping system have received criticism over the past two decades. These included testing accuracy (Pitsch, 2009) and scientific integrity (Pielke & Boye, 2019); infringement on personal privacy (Hanstad & Loland, 2009; Houlihan, 2004), conflicts for physicians (Dikic et al., 2013; Hoberman, 2002), health risks owing to the gaps left in regulation (Camporesi & McNamee, 2014), and problems arising from globalisation and international harmonisation (Kayser & Smith, 2008). Some critiques of the anti-doping system went further and argued that an effective anti-doping system only requires political will (e.g., Berry, 2008; Maennig, 2014; Pielke, 2018). However, in reality, any anti-doping programme has to respond to a dynamic and interdependent system and must overcome significant methodological and logistical challenges.

In response to the emerging challenges over time, continuous developments have been made in anti-doping research. These include improved testing procedures (Bowers & Bigard, 2017), non-analytical approaches (e.g., Ponzetto et al., 2019; Saugy & Leuenberger, 2020) and policy changes (e.g., the whereabouts system; Houlihan et al., 2019; MacGregor et al., 2013), as well as increasing the potential to reduce the use of prohibited performance-enhancing (and -enabling) substances and/or methods (Houlihan et al., 2019). Whilst organisational strategies and policy are constantly improved upon to underpin institutional level legitimacy (Read et al., 2019), anti-doping controls and education operate at the athlete level, and it is these individuals who the anti-doping rules and measures affect. Despite this, the perceived legitimacy of anti-doping organisations and their rules is one still relatively underdeveloped area in anti-doping research.

Athletes are voluntarily deferent and dependent upon National Governing Bodies (NGBs), National Anti-Doping Organisations (NADOs), and international organisations (e.g., International Olympic Committee, WADA, and International Sport Federations) in order to compete within their chosen sport (Overbye, 2016). Additionally, the unique aspect of anti-doping policies, and many sporting rules in fact, lies in the international aspect of sport competition and thus the global harmonisation of the rules across the globe (c.f., Henning & Dimeo, 2018; Overbye, 2016). There is also an irresolvable contradiction between the striving for success and the ideas of 'fair play', especially when it comes to performance enhancement (Bette & Schimank, 2006; Petróczi, Norman & Brueckner, 2017; Christiansen & Møller, 2016). Furthermore, competitive sport boasts multiple stakeholders (e.g., athletes, clubs, governments

[1] This study was published. Full reference: Woolway, T., Lazuras, L., Barkoukis, V., & Petróczi, A. (2020). "Doing what is right and doing it right": a mapping review of athletes' perception of anti-doping legitimacy. *International Journal of Drug Policy*, *84*, 102865. https://doi.org/10.1016/j.drugpo.2020.102865

and general public), each with conceivably different dimensions of what is *proper, effective* or *just* (Read et al., 2019).

WADA's vision to create "a world where all athletes can compete in a doping-free sporting environment" (WADA, 2019) has significantly impacted the world of sport since its creation in 1999. This impact has heavily burdened the athlete, with the introduction of invasive testing procedures, the introduction of the Whereabouts reporting system, and the ever-present potential for anti-doping rule violation (ADRV) via contamination and the Therapeutic Use Exemption (TUE) system. Focusing on those most affected by anti-doping rules, Gleaves and Christiansen (2019) offer a narrative review on how athletes feel about various components of the anti-doping system. This review suggests that athletes generally accept and support the current anti-doping framework but see problems in the implementation of anti-doping policies across all sport and nations, including testing and sanctioning (Gleaves & Christiansen, 2019). Additionally, athletes believe there to be an infringement on privacy and right to private life and express the desire to have input into anti-doping policies and practices (Gleaves & Christiansen, 2019). This perspective highlights the importance of *perceived legitimacy* on the athletes' sense of duty and obligation to obey the rules and practices of WADA (and other Anti-Doping Organisations; ADOs) and thus to the success of these bodies in establishing doping free sport (Read et al., 2019).

Perceived legitimacy as a psychological concept

To govern and control its members, and ensure compliance, the anti-doping system depends upon athletes perceiving anti-doping rules and organizations as legitimate. Perceived legitimacy is a critically important concept because it can influence an individual's level of acceptance and compliance with an organisation and its rules (Tyler, 2006). Indeed, authorities are effective when their rules and actions are perceived to be legitimate by the people that are most affected by them (Jost & Major, 2001).

Theories and models of perceived legitimacy (e.g., Tost, 2011; Tyler, 2006) suggest the process of legitimation develops from judgement formation, through reassessment, to a point where perceptions of legitimacy are used and shape actions and reactions (Tost, 2011). In these theories, it is the individual who perceives organisations, form legitimacy judgements, and then acts upon these judgements producing macro-level effects (Tyler, 2006). Tyler (2006) proposed that the psychological concept of legitimacy occurs when an authority and its actions are seen as *proper*, *just*, and *appropriate*. Central to the development of legitimacy is a perception of the authority as *proper*; that it is perceived as having the right to dictate laws, its values are valid and shared with those ruled (Tyler, 2006). For example, one foundation of anti-doping legitimacy is the shared values between the public, the rule-makers (e.g., WADA) and athletes that clean sport is important, and thus it is worth protecting (Overbye, 2016). This legitimacy may derive from judgements regarding the procedures of exercising authority. Hence it is not the actual fairness of decisions and processes, but the belief that they are fair, applied without discrimination and in a courteous, respectful manner (Henning & Dimeo, 2018).

The second component of legitimacy is the belief that the rules implemented are *appropriate* (Tyler, 2006). In the doping context, this is the belief that anti-doping measures are effective to control the use of prohibited substances or methods (Overbye, 2016). Finally, the third component of legitimacy is the perception that the process is *just*, implying that anti-doping rules, procedures and sanctions are applied in a fair and respectful manner, and applied to all athletes equally (Tyler, 2006).

Perceived legitimacy, and in turn power, is an integral factor of the rule orientated anti-doping system (Read et al., 2019). One avenue for legitimation may exist through institutional justification that anti-doping organisations (WADA, NADOs) are motivated by shared values and beliefs in '*doing what is right*' (or *normative legitimacy*) because doping itself is against the spirit and ideals of sport. This *normative legitimacy* considers what anti-doping organisations plan to achieve and whether this outcome justifies the existence of the organisation (Hinsch, 2008). A second, and perhaps the most influential factor on athlete perceptions of legitimacy is whether the procedures undertaken by these organisations are legitimate; are they '*doing it in the right way*'? This is *procedural legitimacy* or how the anti-doping rules are enforced by the organisations that are entrusted with enforcing these rules (Hinsch, 2008). This differentiation may lead an athlete to view the purpose of anti-doping as legitimate, yet the process of anti-doping as illegitimate (Qvarfordt et al., 2016). It is these interactions between athlete perceptions of legitimacy and anti-doping rules, organisations, and procedures where a gap in the literature exists.

Stakeholders' (i.e., athletes, governing bodies, the public) true perceptions of the legitimacy of anti-doping organisations and procedures, and WADA specifically as the custodian of the Anti-Doping Code, are only revealed when an event challenges the *status quo* (Read et al., 2019). One such recent event has been the investigation into the systemic-level doping in Russia. Read and colleagues (2019) argue that the International and National Olympic Committees and International Sport Federations feel that WADA's functions should be limited to its regulatory capacity. In contrast, national anti-doping agencies, government representatives and athletes pressure WADA to do more to tackle doping use in sport and address doping in sport at all levels. WADA is therefore in a precarious position, balancing between satisfying expectations from multiple stakeholders, whilst constantly challenged by the need for global harmonisation.

Aims

Thus, the aim of the present study is to map out and categorize the extant literature on the perceived legitimacy of anti-doping policies or their elements (e.g., testing selection, protocol, Whereabouts requirements, results management, or anti-doping education) among competitive elite athletes. The key concept we focus here is the *perception of legitimacy*, not the actual legal or institutional legitimacy, because the two are not necessarily the same or even aligned (Gowthorp, Greenhow & O'Brien, 2016). The conceptual map of *perceived legitimacy* of anti-doping testing and organisations utilising Tyler's (2006) three components of legitimacy (*proper, just*, and *appropriate*) to categorise and present the current research specific to anti-doping legitimacy was endorsed. The mapping review is expected to provide the foundation for further literature reviews and empirical studies on this topic, as well as policy recommendations for improving and/or restoring the perceived legitimacy of anti-doping policies among athletes.

Method

Systematic mapping review studies provide a categorical structure for classifying published research articles and results (Dicheva et al., 2015). Whilst similar to systematic reviews with regards to search study selection strategies, a systematic mapping study employs broader inclusion criteria, intends to map out research topics, and structure a research area (Petersen, Vakkalanka, Kuzniarz, 2015). Systematic mapping or scoping studies are designed to 'map rapidly the key concepts underpinning a research area and the main sources and types of evidence available' (Mays, Roberts & Popay, 2001, p.194).

An initial literature search was conducted to assess the feasibility of conducting a systematic mapping review (Arksey & O'Malley, 2005). Following proposed protocol for scoping reviews (Arksey & O'Malley, 2005) and systematic mapping studies (Petersen et al., 2015), we identified and collated a set of articles that empirically investigated athletes' perceptions of at least one aspect of anti-doping rules and procedures to map and categorise the existing research evidence on anti-doping legitimacy perception among athletes.

Mapping framework

The concept map of normative and procedural legitimacy of anti-doping is depicted in Figure 1. In this figure, we mapped various conceptualisation of 'legitimacy as psychological concept' (e.g., Donovan, Jalleh & Gucciardi, 2015; Tost, 2011; Tyler, 2006) into a unified framework, based on the underpinning influence and fairness in the process and fairness of the outcome.

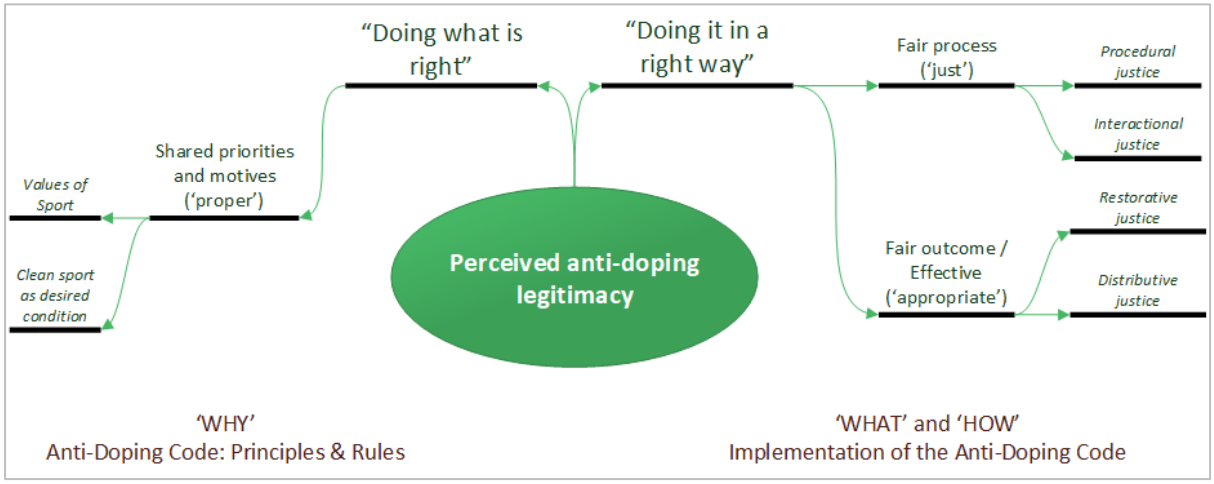

Figure 1: Concept map or anti-doping legitimacy

The normative status of the anti-doping rules (e.g., the World Anti-Doping Code) is derived from the agreement among the stakeholders - athletes, coaches, athlete support personnel, sport organisations, sport governing bodies, fans, spectators and sponsors - that clean sport is worthy of and in need of protection against doping and therefore control of performance-enhancing substances and/or methods is warranted. Having normative legitimacy via this shared goal, the other equally important element is how the anti-doping rules are enforced by the organisations with specific authority and power entrusted with being the custodian of these rules (e.g., World Anti-Doping Agency). Implementation of the anti-doping rules is governed and globally harmonised by the International Standards, which are technical documents that details (1) the list of prohibited substances, (2) procedures for testing and investigation, (3) laboratories, (4) therapeutic use exemptions (TUEs), (5) protection of privacy and personal information, (6) code compliance by signatories, and from 2021, (7) education (WADA, 2021). The final, critical element of the picture are the organisations responsible for the day-to-day execution of the procedures outlined in the technical documents, the national and regional anti-doping organisations (NADOs and RADOs, international sport federations (IFs) and, since 2018, the Independent Testing Agency (ITA).

Search Strategy

The literature search was conducted in two waves. First, a computerised literature search of electronic databases (EBSCOHost, PubMed, Ingenta, ScienceDirect, SCOPUS, SPORTDiscuss and Google Scholar) was conducted using the search terms anti-doping AND either legit* (for legitimate, legitimacy and legitimation) OR perception, athlete, policy and judgement. In the second wave, we extended the search terms by including keywords reflecting distinct components of normative and procedural legitimacy, guided by the concept map presented in Figure 1. These keywords were: anti-doping AND athlete AND either attitude, view, opinion or perception AND either deterrence (of anti-doping measures), testing, effectiveness, sanction, whereabouts, whistleblowing, education, 'values of sport' or 'spirit of sport'. Studies on athletes' attitudes toward doping use, knowledge of anti-doping rules, deterrence factors (e.g., health, morality, fear of sanctions) and motivators were excluded unless connection to legitimacy components (i.e., justness, fairness, effectiveness) were explicitly made in the data. Only empirical studies (regardless of the methodology) were included. All studies which were identified through the various search methods were included in the review. Where the search identified a study reported in a language other than English, an English language version was obtained. Theoretical, conceptual papers and analysis of legal cases or aspects were excluded. The initial computerised searches were conducted by two of the authors, following which the remaining authors were included in the appraisal and data extraction of the included papers. If there was agreement by three or more authors on how to categorise a paper, this was accepted. When only half of the authors believed a study could be categorised into *proper, just or appropriate* a further discussion was held, and when only one author categorised a paper into a legitimacy factor this study was excluded from this category. There was agreement on at least one category for each included research study. There is no clear distinction between the three categories of legitimacy used to present the findings of this review. Judgements were made based on what questions were asked and what results were presented. This categorisation was often ambiguous and based on the individual judgements of the authors.

A hand-search of the reference lists of identified articles, relevant journals and those publishing journals of identified articles was conducted to identify any articles missed during the electronic database search. Publicly available research reports for grant funding bodies (e.g., WADA, IOC), and research degrees (PhD, MRes) were included. Surveys conducted by anti-doping organisations and governing bodies were also added. The search and selection process is shown in Figure 2. Eligible articles published before March 2020 are included.

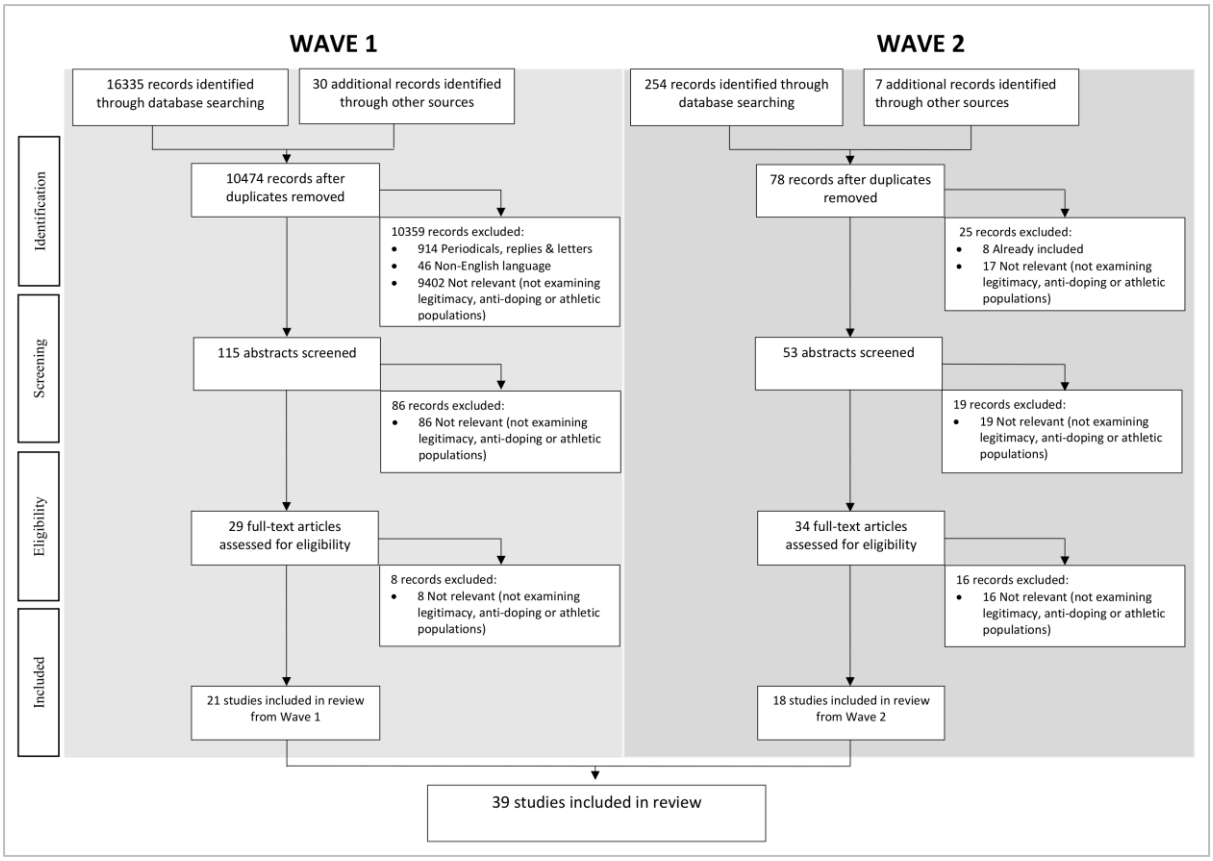

Figure 2: Literature search flow chart

Data analysis

Following the literature search, Tyler's (2006) three components of legitimacy (proper, just and appropriate) were retrospectively used to provide a framework by which to discuss the studies and their findings. The authors agreed upon definitions for each which were then applied for this categorisation. For the categorisation, anti-doping rules and regulations were perceived to be:

1. '*proper*' when athletes participating in the study explicitly expressed their views on anti-doping rules and its underpinning values. At the operational level, this legitimacy component answered the question: *why* are we doing it? Example questions to guide the assessments were: "*Are anti-doping rules justified on some important values, e.g., values of sport or health of the athletes?"*, "*Are anti-doping rules in place to protect athletes and integrity of sport?"*;
2. '*just*' when athletes participating in the study expressed their views on anti-doping processes as outlined in the WADA Anti-Doping Code (e.g., sample collection, results management, whereabouts, etc.). For assessment, this legitimacy aspect answered the question: *what* do we do and *how* does it protect clean sport? Example questions to guide the assessments were: "*Are all athletes subject to testing equally?*", "*Is the responsibility for anti-doping shared among stakeholders fairly?*", "*Are rule-breakers punished?*", "*Is punishment for anti-doping rule violation proportionate?*", "*Are costs and burden of doping control shared fairly among stakeholders?*", "*Are athletes supported for complying with anti-doping rules?*";
3. '*appropriate*' when athletes participating in the study expressed their views on the effectiveness of the anti-doping measures. At the operational level, this legitimacy component answered the

question: *is it* [anti-doping] *working*? Example questions to guide the assessments were: "*Do anti-doping rules effectively do the job (i.e., catching rule-breakers)?*", "*Is testing robust against manipulation and false positives?*", "*Are athletes supported via education to prevent anti-doping rule violations?*".

For a study to be categorised in any of the legitimacy component, evidence had to be present in the data. Where inferences were only made by the researchers in the discussion (as opposed to directly by the study participants in the data), the study was not included.

For each individual study, 'zero' was entered if the study did not fit into category or 1 if the study fits into category. Classifications were then collated and results shared among the authors for revision and discussion. A study had to score with three out of four raters to be placed in a legitimacy category. Inter-rater reliability analysis was conducted following the initial independent rater assessments and following discussion and revisions to assessments. Inter-rater agreement between authors' judgement on whether the included studies could be categorised into *proper*, *just* or *appropriate* was expressed with Fleiss' kappa coefficient at both time points.

Results

Search Results

The systematic electronic search yielded 16,589 potential records. Thirty-seven additional papers were identified through hand-searching of reference lists and relevant journals. After removing duplicates, 10,552 records were reviewed by reading the title. Records were excluded if they were not relevant (studies on athletes' attitudes toward doping use, knowledge of anti-doping rules, deterrence factors and motivators), were periodicals or letters, or were not published in English. Following this stage, the abstracts of 168 papers were retrieved and reviewed, after which 86 studies were excluded as not relevant to athlete perceptions of anti-doping legitimacy. The resulting 63 full-text articles were assessed for relevance. Amongst this research, only thirty-nine records studied anti-doping legitimacy perceptions of athletes and thus were selected for inclusion in the current review.

Characteristics of Selected Studies

Thirty-nine studies, including 31 research articles, two conference abstracts and six research reports, were selected for inclusion as research on the perceived legitimacy of anti-doping organisations and testing. Thirty of these studies utilised quantitative methodology (Al Ghobain, 2019; Donovan et al., 2015; Bourdon et al., 2014; Canadian Centre for Ethics in Sport (CCES), 2013; de Hon, Eijs & Havenga, 2011; Duiven, de Hon & Netherlands ADA, 2015; Dunn et al.,2010; Efverstrom et al., 2016; Elbe & Overbye, 2014; Gebert, Lamprecht & Stamm, 2017; Global Athlete, 2020; Gucciardi, Jalleh, & Donovan, 2011; Hanstad & Loland, 2009; Hanstad, Skille & Thurnston, 2009; Jalleh, Donovan, & Jobling, 2013; Judge et al., 2010; Moston, Engelberg & Skinner, 2015a; Nolte et al., 2014; Orr et al., 2010; Overbye, 2016; Overbye, 2017; Overbye et al., 2014; Overbye & Wagner, 2013; Overbye & Wagner, 2014; Sas-Nowosielski & Świątkowska, 2007; Scharf, Zurawski & Ruthenberg, 2018; Striegel, Vollkommer & Dickhuth, 2002; USADA, 2017; Valkenburg, de Hon & van Hilvoorde, 2014; Westmattelmann et al., 2018) and nine used a qualitative approach to data collection and analysis (Bloodworth & McNamee, 2010; Efverstrom et al., 2016; Engelberg, Moston & Skinner, 2015; Erickson, Backhouse & Carless, 2017; Henning & Dimeo, 2018;

Kegelaers et al., 2018; Kirby, Moran & Guerin, 2011; Massucci, Butryn, & Johnson, 2019; Qvarfordt et al., 2019). The legitimacy factor studied by method is summarised in Table 1.

Table 1: Methods used in the included studies

Methods used in studies	Total	Focus	Number of studies
Cross-sectional surveys	30	Proper	14
		Just	21
		Appropriate	28
Qualitative interviews	9	Proper	4
		Just	5
		Appropriate	7

The included studies were conducted internationally in Australia, Belgium, Brazil, Canada, Denmark, France, Germany, India, Netherlands, Norway, Poland, South Africa, Switzerland, the USA and the UK. The frequency of study location and number of participants per nationality is presented in Table 2.

Table 2: Location of studies and number of participants by country

Country	Number of studies	Number of participants
Australia	7	4886
Denmark	6	3625
International	5	802
Germany	3	770
Netherlands	3	1301
USA	2	1126
Norway	2	472
Switzerland	1	588
Poland	1	830
Saudi Arabia	1	408
Canada	1	90
United Kingdom	1	40
USA & Canada	1	12
France, Belgium & Switzerland	1	69
South Africa	1	346
UK & USA	1	28
Ireland, Scandinavia & USA	1	5
Belgium	1	36

The reviewed studies included journal articles, conference abstracts, NADO and WADA research reports and independent research reports. Most of the included studies (79%) were disseminated as peer-reviewed research articles. The exact frequency of each study type is presented in Table 3.

Table 3: Type of research studies included

Type of research	Number of studies
Journal article	31
Conference abstract	2
NADO research	4
WADA report	1
Independent research report	1

In the studies that reported gender, fifty-nine percent of participants were male, with 8009 out of the 13487 reported participants. The participants were all identified as being of 'elite-status', however the definition of this elite status varied from high school level competitors to Olympic and International level athletes. The key characteristics and outcomes of the included empirical studies are summarised in Appendix A.

Anti-doping legitimacy components

Almost all included studies (n = 35) were related to fairness in the outcomes of anti-doping and thus considered as '*appropriate*' in terms of legitimacy component. Two-thirds of the studies (n = 26) assessed perceptions of the anti-doping processes ('*just*'). Surprisingly, less than half of the included studies (n = 18) included the underpinning values and normative component ('*proper*') of legitimacy perception. Of the included studies, the majority touched upon more than one legitimacy component. Only eleven studies included all three components of anti-doping legitimacy. The highest proportion of the 39 studies (n = 14) included data on anti-doping being *just* and *appropriate*. The numbers of studies in single- and joint categories are shown in Figure 3.

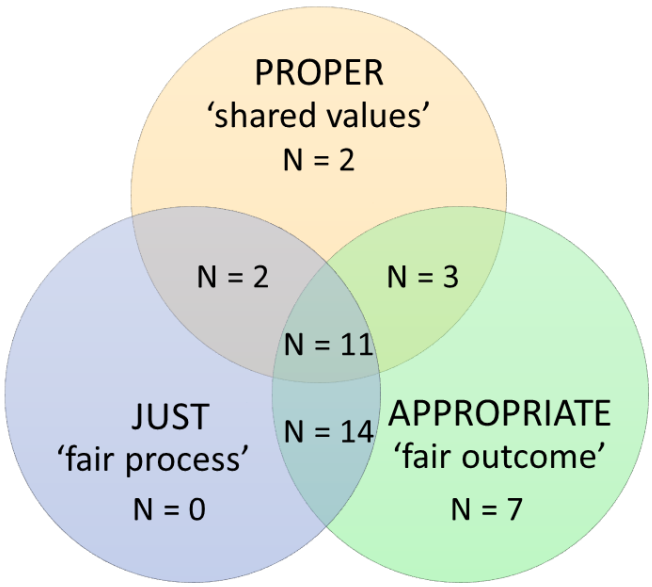

Figure 3: Overview of the included studies with single vs. multiple anti-doping legitimacy components

Inter-rater reliability

All four authors rated each of the included 39 papers independently and results were collated once all assessments were made. Based on the initial assessment, individual Fleiss' kappa was run for each of the three categories. Fleiss' kappa for *proper* showed that there was fair agreement between the authors'

judgements, K =.261 (95% CI, .256 to .265, $p < .0005$). For *just,* Fleiss' kappa showed that there was fair agreement between the authors' judgements, K =.296 (95% CI, .292 to .300, $p < .0005$). Finally, for *appropriate*, Fleiss' kappa showed that there was fair agreement between the authors' judgements, K =.294 (95% CI, .290 to .299, $p < .0005$).

After discussion and revision, Fleiss' kappa for *proper* showed that there was moderate agreement between the authors' judgements, K =.473 (95% CI, .467 to .479, $p < .0005$). For *just,* Fleiss' kappa showed that there was moderate agreement between the authors' judgements, K =.400 (95% CI, .396 to .404, $p < .0005$). Finally, for *appropriate*, Fleiss' kappa showed that there was fair agreement between the authors' judgements, K =.354 (95% CI, .350 to .358, $p < .0005$).

Main Outcomes

The main outcomes are categorised according to Tyler (2006) taxonomy but contextualised in anti-doping. The mindmap of the main outcomes is depicted in Figure 4, which also serve as a 'one-glance' summary of the results and included to help readers to navigate in the result section.

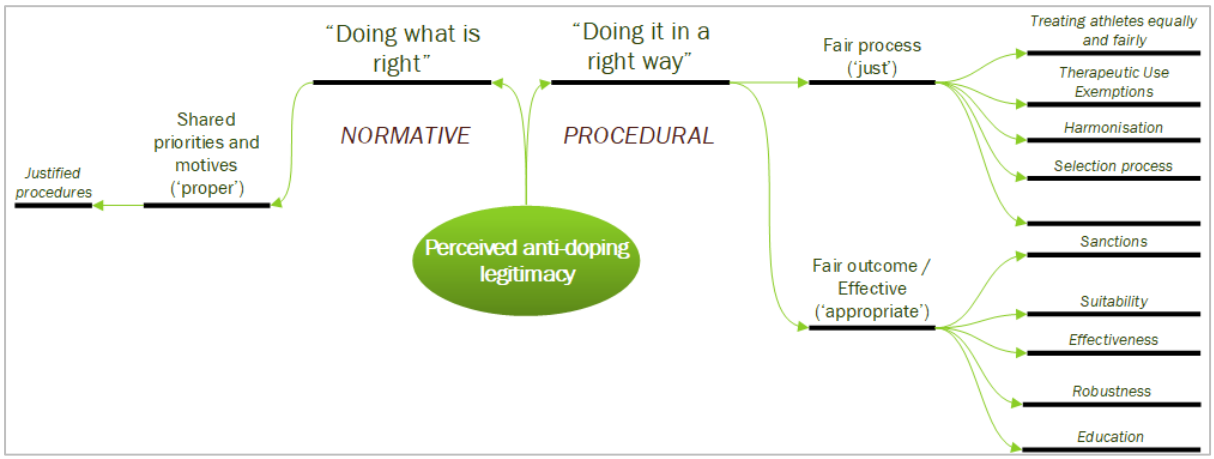

Figure 4: Components of anti-doping legitimacy (empirical results)[2]

Proper

Justified procedures. Seventeen of the included studies in this review examined whether athletes perceived anti-doping testing and procedures as justified and shared the values of the anti-doping system (Bloodworth & McNamee, 2010; Bourdon et al., 2014; de Hon et al., 2011; Duiven et al., 2015, Efverstrom et al., 2016a; Engelberg et al., 2015; Erickson et al., 2017; Hanstad & Loland, 2009; Hanstad, et al. 2009; Henning & Dimeo, 2018; Nolte et al., 2014; Orr et al., 2010; Overbye & Wagner, 2014; Sas-Nowosielski & Swiatkowska, 2007; Scharf et al., 2018; Striegel et al., 2002; USADA, 2017; Valkenburg et al., 2014). These studies were from the USA (2), the UK, Poland, Denmark, Norway, Australia, the Netherlands (2), South Africa, Germany (2) and an International sample (2).

[2] This figure is not included in the published article

Student-athletes from the UK and USA reported that PED use is fundamentally wrong, and it's 'not what sport is about' (p. 49, Erickson et al., 2017) and South African high school athletes agreed that PED use was morally wrong (84%; Nolte et al., 2014). Young British athletes felt social and moral expectations to be a significant deterrent (Bloodworth & McNamee, 2010). Ninety-eight percent of German athletes accepted the system as a necessity (Striegel et al., 2002), with 80% of international athletes agreeing that anti-doping activities are essential and accepted the legitimacy of the rules themselves (Efverstrom et al., 2016a), and 93% of American athletes supporting the purpose of their National Anti-Doping Agency (USADA, 2017). An international sample of athletes reported that their beliefs relating to anti-doping were reflected in the existence and purpose of anti-doping bodies (Henning & Dimeo, 2018) and 68% of Australian athletes considered an effective drug testing program as important for their sport (Orr et al., 2010). Polish athletes reported a positive attitude towards doping control system (Sas-Nowosielski & Swiatkowska, 2007). Eighty-one percent of Dutch athletes never had doubts about the integrity of doping controls, which was a 13% increase over a five-year period (Duiven et al., 2015). However, Duiven and colleagues (2015) reported comments from elite-status athletes who questioned the integrity of the doping system external to the Netherlands. Additionally, a sample of Australian bodybuilders who had committed anti-doping violations, favoured a system whereby each sport is self-governing, and an over-arching organisation does not exist (Engelberg et al., 2015). Conversely, athletes in other sports were still in favour of a central anti-doping system (Engelberg et al.,2015). More than half of Dutch athletes supported the principle of out of competition testing (de Hon et al., 2011).

With regards to the Whereabouts system, a third of Dutch athletes believed the system to have a negative influence on the pleasure derived from being an athlete (Valkenburg et al., 2014) and less than 20% find it necessary to file Whereabouts information in their sport (de Hon et al., 2011). Norwegian athletes reported considerable scepticism and raised objections when asked about the justification of the Whereabouts system (Hanstad & Loland, 2009). However, the majority of German female (88%) and male (86%) athletes believed that out of competition testing, enforced via the Whereabouts system protected sport from doping (Scharf et al., 2018). Additionally, a high percentage of Danish, French, Belgian and Swiss athletes considered the Whereabouts system as necessary (Bourdon et al., 2014; Overbye & Wagner, 2014). Forty-three percent of Norwegian athletes agreed that the whereabouts information system made a contribution to a "cleaner" sport (Hanstad et al., 2009).

Just

Treating athletes equally and fairly.

Athletes' perceptions of fairness within the anti-doping system was the focus of nine studies included in this review (Al Ghobain, 2019; Donovan et al., 2015; Elbe & Overbye, 2014; Engelberg et al., 2015; Hanstad et al., 2009; Judge et al., 2010; Qvarfordt et al., 2019; Scharf et al., 2018; Valkenburg et al., 2014; Westmattelmann et al., 2018). These studies were conducted with participants from Australia (2), Norway, Germany (2), the Netherlands, Saudi Arabia, an international sample and the USA.

With regard to their own NADO, 70% of Saudi athletes believed that the Saudi Anti-doping Committee treated all athletes equally (Al Ghobain, 2019) with the majority of Australian athletes agreeing in relation to their NADO (Donovan et al., 2015). Sixty-eight percent of US athletes reported a belief that the current protocols for testing were fair (Judge et al., 2010). Ninety-eight percent of Danish athletes believed that it is fine to be tested for doping (Elbe & Overbye, 2014). However, a group of

Australian bodybuilders who had previously committed anti-doping violations believed the anti-doping system is hypocritical and unfair (Engelberg et al., 2015). Norwegian athletes raised concerns on the fairness of the Whereabouts system (Hanstad et al., 2009). Additionally, German athletes agreed that they felt that leaving Whereabouts information was an intrusion into their privacy (Scharf et al., 2018). An international sample of athletes highlighted the limited opportunities that some athletes face, in relation to education and information, and a scepticism over the true representative nature of athlete committees (Qvarfordt et al., 2019).

With specific regard to the Whereabout system, Valkenburg et al. (2014) found that 30% of Dutch athletes believed that whereabouts requirements are a violation of privacy, 26% agreed that organisations interfere too much in their private life and 43% agreed that the time requirements limit their freedom. Westmattelmann and colleagues (2018) found that doubts regarding privacy issues (i.e., where data are stored, how they are used and who has access) may lead to a mistrust in the ADAMS system as a whole.

Therapeutic Use Exemptions. One study included in the current review specifically focused on athletes' perceptions of the TUE system (Overbye & Wagner, 2013). This study included 645 Danish athletes who had completed a web-based survey. Fifty-one percent of these athletes believed that some TUEs were obtained without genuine medical need. Athletes themselves who had previously obtained a TUE were more likely to distrust the system (66%) compared to those who never had a need for a TUE (46%).

Harmonization. The harmonization of anti-doping agencies, testing and efforts on an international scale was the focus of thirteen studies included in the current review (Bloodworth & McNamee, 2010; Bourdon et al., 2014; de Hon et al., 2011; Duiven et al.2015; Efverstrom et al., 2016a; Efverstrom et al., 2016b; Gebert et al., 2017; Global Athlete, 2020; Hanstad & Loland, 2009; Henning & Dimeo, 2018; Overbye, 2016; Overbye & Wagner, 2014; USADA, 2017). These studies explored the perceptions of athletes from the UK, the USA, the Netherlands, Norway, France, Belgium, Switzerland (2), Denmark (2) and international samples (4).

Danish athletes reported that the testing in other countries was not extensive enough (73% agreed) and that these tests are conducted in an unprofessional manner that makes cheating the system possible (46% agreed; Overbye, 2016). Despite being in favour of anti-doping, a small international sample of athletes expressed scepticism about the ability of the system to harmonize international efforts (Henning & Dimeo, 2018). One potential explanation for these beliefs is that athletes also perceived that doping control is downgraded in other countries in order to achieve success. Similarly, American athletes believed that anti-doping programs other to theirs were less effective or not effective (28% and 6% respectively, 49% did not know; USADA, 2017) and Swiss athletes believed it to be untrue that those using doping in other countries had a high risk of being caught compared to their own country (47% versus 13% respectively; Gebert et al., 2017). Dutch athletes expressed doubts about the integrity of doping controls outside the Netherlands (Duiven et al., 2015) and British athletes made extensive references to a belief that testing procedures were less stringent in some other countries than in the UK (Bloodworth & McNamee, 2010). Athletes from an international sample reported higher levels of trust in their NADO (32% completely and 55% mostly) than in the international anti-doping system (15% completely and 45% mostly) with 23% having experienced conflicts caused by different NADO policies between countries

(Global Athlete, 2020). Additionally, Dutch Olympic athletes and professional footballers favoured better harmonisation within the anti-doping system (de Hon et al., 2011).

With specific regard to the Whereabouts system, athletes trust in the system was low regarding its operation in other countries (Overbye & Wagner, 2014) and 44% believed that the Whereabouts system did not work in all countries (Efverstrom et al., 2016a). Fifty-eight percent of French speaking athletes perceived the application of the Whereabouts system to be unequal between countries and sports (Bourdon et al., 2014) and Norwegian athletes in the national registered testing pool reported that the system was unfair as it was not implemented for all athletes (Hanstad & Loland, 2009). British athletes reported scepticism of the utilisation of the Whereabouts system abroad in response to interactions with fellow athletes from other countries who had declared that they were not required to submit Whereabouts information (Bloodworth & McNamee, 2010). In addition, Efverstrom and colleagues (2016b) reported perceptions of athletes who believed that their National Anti-Doping Agency did not provide equal opportunities to be compliant and access knowledge and education. Particularly, these athletes highlighted that accessing such systems as Whereabouts and the technology required for this were difficult within their country.

Sanctions. The fairness of the sanction and hearing process was the focus of seven studies included in this review (Al Ghobain, 2019; Dunn et al., 2010; Engelberg et al., 2015; Hanstad & Loland, 2009; Jalleh et al., 2013; Moston et al., 2015a; USADA, 2017). These studies were conducted in Saudi Arabia, Norway, Australia (4) and the USA. Jalleh and colleagues (2013) examined athlete satisfaction with the possibility of receiving a fair hearing from their National Anti-Doping Agency following a positive test (1.88), before any sanctions (1.88) and in the Court of Arbitration for Sport (1.82) on a four-point Likert-type scale (1 Very satisfied – 4 Very Dissatisfied). In addition, 55% of USA athletes agreed or strongly agreed that the USADA anti- doping management and adjudication processes were fair (USADA, 2017). Sixty-seven percent of Saudi elite male athletes were satisfied that there would be a fair-hearing session for athletes testing positive for a banned substance (Al Ghobain, 2019). Additionally, athletes believed that sanctions for being caught were of the appropriate severity (Dunn et al., 2010). However, Australian bodybuilders, who had previously committed anti-doping violations, believed the sanctioning process to be hypocritical and unfair (Engelberg et al., 2015). Norwegian athletes questioned the fairness of sanctions for violations associated with the Whereabouts system and suggested that there should be separation between 'oversights' in updating information and actual doping cases (Hanstad & Loland, 2009).

Selection process. Two studies, conducted in Denmark and an international sample focused on the selection process for anti-doping testing (Efverstrom et al., 2016; Overbye, 2016). Eighty-two percent of surveyed 261 athletes agreed that selection for anti-doping testing in competition was fair, with 74% also agreeing to its fairness out-of-competition (Efverstrom et al., 2016). Overbye (2016) reported that 33% of 645 Danish athletes disagreed that the number of anti-doping tests were appropriate, citing that the same athletes were tested repetitively, the wrong athletes were tested, and that the tests were too frequent.

Appropriate

Suitability. The suitability of testing protocols and their infringement upon athlete lifestyle was examined by seven of the included studies (Bourdon et al., 2014; Elbe & Overbye, 2014; Hanstad &

Loland, 2009; Orr et al., 2010; Qvarfordt et al., 2019; Scharf et al., 2018; Valkenburg et al., 2014). These studies were conducted in France, Belgium, Switzerland, Denmark, Germany, the Netherlands and an international sample.

Sixty-one percent of Australian athletes believed that one to three anti-doping tests a year would be an appropriate amount (Orr et al., 2010). Scharf et al. (2018) found that German male (70%) and female (72%) agreed that they felt constantly watched by the need to enter their whereabouts, and that approximately half of athletes felt the whereabouts system was an intrusion into their privacy (females 51%; males 52%). The majority of athletes felt that the time commitments of anti-doping limit their freedom (Valkenburg et al., 2014) and that the whereabouts system infringes too much on their private life (Bourdon et al., 2014; Hanstad & Loland, 2009). Elbe and Overbye (2014) found that Danish athletes felt it is a violation of personal integrity for someone to watch urination for anti-doping requirements, and thus doping controls are an invasion of privacy. An international sample of athletes perceived that limited information regarding doping and a lack of leeway relating to anti-doping exist, thus putting the anti-doping system at risk (Qvarfordt et al., 2019).

Effectiveness. Fourteen of the included studies assessed perceptions of the effectiveness of anti-doping organisations and testing procedures to prevent the use of doping within their sport (Bourdon et al., 2014; CCES, 2013; Donovan et al., 2015; Dunn et al., 2010; Global Athlete, 2020; Gucciardi et al., 2011; Hanstad & Loland, 2009; Henning & Dimeo, 2018; Kegelaers et al., 2018; Massucci et al., 2019; Moston et al., 2015a; Overbye, 2017; Overbye & Wagner, 2013; Overbye & Wagner, 2014; Striegel et al., 2002). These studies reported the perceptions of athletes from Australia (4), Canada (2), Germany, the USA, France, Belgium (2), Switzerland, Norway, Denmark (2) and an international sample (2).

Sixty-three percent of Australian athletes agreed or strongly agreed that the current anti-doping regime was effective (Moston et al., 2015a). Seventy-eight percent of athletes in an international sample found their NADO to be efficient at combatting doping in their country (24% extremely efficient and 54% somewhat efficient; Global Athlete, 2020). Conversely, Overbye and Wagner (2014) reported that participants trust in the anti-doping system's ability to catch doped athletes was low, and that this distrust increased with experience of the whereabouts system. Additionally, 51% of athletes believed that athletes within their sport received TUEs without a medical need (Overbye & Wagner, 2013). A larger number of international athletes agreed that their NADO worked transparently (58%) than those who believed WADA worked transparently (30%; Global Athlete, 2020). In the same study, 79% of athletes believed there should be governance reform to include an equal representation of sport federations, governments, NADOs and athletes on the WADA Foundation Board. French speaking athletes reported only partial trust in the anti-doping systems capability to detect doping (Bourdon et al., 2014). In addition, North American triathletes were dubious of testing effectiveness based on a lack of testing and a perception that doped athletes were testing clean (Massucci et al., 2019) and Australian athletes were unsure as to the accuracy of anti-doping testing (Donovan et al., 2015).

Belgian athletes perceived the chance of being caught as low due to few controls and knowledge of when the controls would occur (Kegelaers et al., 2018) however 75% of Danish athletes believed that the likelihood of testing positive would act as a deterrent (Overbye, 2017). Similarly, 76% of Australian athletes believed that testing is an effective deterrent to doping (Dunn et al., 2010). The majority of Canadian athletes believed their NADO to be doing a good job (85%) and maintaining the integrity of

clean sport (78%) but that the deliberate dopers were always one step ahead of the doping controls (CCES, 2013). Only 43% of Norwegian athletes agreed that the whereabouts system has made a contribution to reducing doping (Hanstad & Loland, 2009). Henning and Dimeo (2018) reported that athletes question the ability of the anti-doping system to effectively deter athletes from doping. German athletes favoured improved methods of detection over more severe punishments in order to improve the effectiveness of the anti-doping system (Striegel et al., 2002).

Sanctions. Seven studies discussed the effectiveness of sanctions as doping prevention (Dunn et al., 2010; Engelberg et al., 2015; Kegelaers et al., 2018; Kirby et al, 2011; Moston et al., 2015a; Overbye et al., 2014; Westmattelmann et al., 2018). With a focus on the effectiveness of sanctions as deterrents to doping, Overbye et al. (2014) found that despite 78% of athletes regarding a ban as a deterrent, potential social, self-imposed and financial consequences are greater deterrents to doping. Additionally, Belgian athletes identified that possible sanctions including suspension and the end of one's athletic career as possible 'anti-pull factors, however a lack of heavy sanctions was also cited as a potential 'push' factor by two of the participants (Kegelaers et al., 2018). Three-fifths of Australian athletes agreed that the current punishments for being detected with a banned substance was appropriate (Dunn et al., 2010). Additionally, the majority of Australian athletes, excluding bodybuilders, who had previously committed anti-doping violations believed that there should be stricter and more stringent sanctions for all drug violations (Engelberg et al., 2015). The bodybuilders in this sample believed that there should be less punitive sanctions than those currently in place (Engelberg et al., 2015). In another sample of Australian athletes, low percentages were particularly sceptical of the certainty of legal and material sanctions resulting from anti-doping violations (Moston et al., 2015a). However, German athletes considered improvements in diagnostics to be the most effective anti-doping deterrents with fines and leniency programs to be the least effective (Westmattelmann et al., 2018). When discussing their experiences of doping, four of five athletes who had doped, reported that being caught was only a minor concern (Kirby et al., 2011)

Robustness. Seven studies in the current review investigated the security of testing (Al Ghobain, 2019; Donovan et al., 2015; Duiven et al, 2015; Gebert et al., 2017; Jalleh et al., 2013; Massucci et al., 2019; Overbye, 2016; USADA, 2017). These studies were conducted in the USA (2), Canada, Saudi Arabia, Australia (2), Switzerland and Denmark.

Seventy-seven percent of athletes either agree or strongly-agree that the USADA anti-doping testing is secure (USADA, 2017), with Australian athletes reporting that they believed that the security of ASADA testing was very secure (1.48 on a 1 very secure' to 4 'not secure', Jalleh et al., 2013; 95% very or quite secure, Donovan et al., 2015), and 85% of Swiss athletes believe that the way in which Anti-doping Switzerland carry out doping control and testing to be secure (Gebert et al., 2017). Almost three quarters of elite Saudi male athletes believed that drug-testing procedures were secure (72%; Al Ghobain, 2019). Only 15% of Danish elite athletes agreed that testing was so unprofessional that it would be possible to cheat (Overbye, 2016). Eighty-one percent of elite-status athletes never had any doubts about the integrity of a doping control (Duiven et al., 2015). However, Massucci and colleagues (2019) suggest that athletes may suppress their concerns about integrity and robustness of the testing process.

Education. Six studies focussed on athletes' views on anti-doping education (de Hon et al., 2011; Efverstrom et al., 2016b; Nolte et al., 2014; Orr et al., 2010; Qvarfordt et al., 2019; Westmattelmann et al., 2018). Fifty-nine percent of South African high school athletes disagreed that there was enough being done in South Africa to educate athletes regarding the implications of using prohibited substances or methods (Nolte et al., 2014). Comparatively, low percentages of Australian athletes considered they were kept informed of the drug testing procedures and performance enhancing substances (Orr et al., 2010). Qvarfordt and colleagues (2019) found that some athletes believe that there is a lack of information and education regarding anti-doping regulations. Dutch Olympic athletes and professional footballers favoured the provision of more educational opportunities relating to anti-doping (de Hon et al., 2011). For German cyclists and track and field athletes, education programs were perceived as moderately effective in keeping athletes from doping, and less effective than control or punishment measures (Westmattelmann et al., 2018). An international sample of athletes reported perceptions that highlighted the differing access to knowledge and education across contexts, cultures, languages and technology access (Efverstrom et al., 2016b).

Discussion

The current mapping review aimed to map out and categorize the extant literature on athletes' perceptions of legitimacy of anti-doping policies or constituents, and provide foundations for future reviews, empirical studies and policy recommendations for improving and/or restoring the perceived legitimacy of anti-doping policies and organisations. Following the literature search and an initial review of the included papers, Tyler's (2006) three components of perceived legitimacy (*proper, just* and *appropriate*) were applied retrospectively to provide a categorising framework. The findings of the studies included in this review indicated that Tyler's (2006) model of legitimacy can be applied in the context of anti-doping policies. This suggests that perceived legitimacy of authority can be used to better comprehend athletes' perceptions of legitimacy of anti-doping policies. However, it is important to note that other legitimacy frameworks and theories may be suitable to apply to the perceptions of the anti-doping system. Furthermore, anti-doping authorities should take this into account and aim to develop fair procedures and favourable outcomes in order to increase athletes' perceptions of legitimacy (Van der Toorn et al., 2011).

The studies included in this review explore the perceptions of differing aspects of the anti-doping system, from the Whereabouts system (Scharf et al.,, 2018) and the obtaining of TUEs (Overbye & Wagner, 2013) to athletes' perceived legitimacy of the anti-doping system (Efverstrom et al., 2016a). Despite athletes' perceived legitimacy of the anti-doping system, its organisations and their rules not always being the focus of the studies included in this review, it is possible to link the beliefs identified and perceptions of whole-system legitimacy. It is the formation of these judgements regarding individual aspects of the anti-doping system, which may lead an athlete to perceive an ADO or its rules as *doing what is right* and that they are *doing it in the right way*. These micro-level perceptions of legitimacy are assessed and reassessed until they are used and shape actions and reactions producing macro-level effects (Tost, 2011; Tyler, 2006). Therefore, the included studies which investigated individual aspects of the anti-doping system are utilised to determine athletes' perceptions of legitimacy of those specific areas and taken together to analyse perceived legitimacy of the system as a whole.

Interestingly, the findings of the review suggest consistent findings with respect to athletes' perceptions of anti-doping policies as *proper* (c.f., Bourdon et al., 2014; Henning & Dimeo, 2018). The vast majority of the athletes suggested that the anti-doping policies are justified (Henning & Dimeo, 2018; USADA, 2017). Importantly, the participants in the reviewed studies viewed the anti-doping policies as a necessary and essential aspect of the effort to maintain sport clean (Efverstrom et al., 2016a; Elbe & Overbye, 2014). However, certain studies (Engelberg et al., 2015; Global Athlete, 2020) identified a perception that NADOs work more transparently than the centralised WADA system (Global Athlete, 2020) and that self-governing sports bodies would alleviate any poor perceptions of the anti-doping system caused by an over-arching organisation (Engelberg et al., 2015). When considered together, this evidence provides strong support for the legitimacy of anti-doping authorities and their efforts (policies and testing) towards achieving clean sport. It suggests that the majority of athletes perceive the existence of anti-doping organisations (i.e., WADA, NADOs) as '*doing what is right*' however there is an extent to which international anti-doping organisations are viewed as legitimate. Perhaps particularly insightful are the findings by Engelberg and colleagues (2015) as the perceptions of those who have committed anti-doping rule violations, may be particularly valuable when considering how to increase perceptions of legitimacy, as it is these individuals who are likely to have a greater understanding of the positive test and sanctioning process (Engelberg et al., 2015).

Conversely to Engelberg et al.'s (2015), bodybuilders who advocated self-governing sports, Gleaves and Christiansen (2019) found that athletes express general satisfaction with WADA, and its ambitions to homogenise anti-doping effort. Considering that perceptions of authority's legitimacy increases subordinates' sense of duty and obligation to obey (Skitka et al., 2009), anti-doping authorities should further promote this global view of doping as immoral action and capitalise athlete views in increasing the legitimacy of anti-doping policies. However, organisations should consider their approach to each sport, environment and setting in an individualistic manner as evidence suggests differing views may exist, and generalising that *all* athletes perceive legitimacy may discount these athletes.

Consistent findings existed across the majority of studies which assessed aspects of the anti-doping system considered to influence perceptions of the *just* nature of this system. The majority of athletes reported trust in their national anti-doping authorities but were sceptical about whether anti-doping authorities and procedures were harmonised internationally (c.f. Duiven et al., 2015). In one study, Danish athletes also reported low levels of trust with the TUE system (Overbye & Wagner, 2013). Whilst some athletes' perceptions may be influenced through interactions with other athletes (c.f. Bloodworth & McNamee, 2010), these findings regarding harmonisation may be attributed to a lack of knowledge of anti-doping activities in other countries. Additionally, the presence of doping incidences from other countries in the news may have an impact. Large doping cases (i.e., the RUSADA scandal) receive vast international media attention potentially resulting in scepticism of the integrity of anti-doping authorities. In turn, athletes may generalise and form false beliefs that anti-doping policies are not harmonised internationally (see Skitka et al., 2009). Therefore, global anti-doping authorities (e.g., WADA, IOC, iNADO) should better promote the activities of local and regional anti-doping authorities and invest in the support of the global anti-doping movement.

Results of the reviewed studies demonstrate that athletes have diverging views on the *appropriate* nature of the anti-doping system. The majority of athletes reported feeling that procedures (Whereabouts, number of tests, etc.) are an intrusion on their lives (c.f. Scharf et al., 2018). A higher

number of studies reported that athletes reported mistrust, were dubious and voiced concerns over the effectiveness of the anti-doping system to catch violations than those who believed it to be effective (c.f., Massucci et al., 2019; Moston et al., 2015a). These findings imply that athletes trust the anti-doping policies and organizations, but they do not believe it is '*done the right way*' and, therefore, its effectiveness is limited. This is also corroborated by previous evidence suggesting that athletes hold wrong beliefs about the prevalence of doping (e.g., Barkoukis et al., 2013; Lazuras et al., 2010; Moston, Engelberg, & Skinner, 2015b; Uvacsek et al., 2011). This inconsistency between the perceived legitimacy of anti-doping rules and organizations may result in a lack of compliance with the anti-doping system. In particular, Donovan et al. (2002) suggested that the more perceived inequity between athlete and their competitors, the greater the likelihood that they will dope. Therefore, athletes will stop supporting a system that is robust but not effective. To address this issue anti-doping authorities should work on increasing awareness about doping prevalence and promote the results of the anti-doping authorities to the community of athletes.

It is important to anti-doping bodies (i.e., WADA, NGBs and NADOs) to strengthen athletes' perceptions of legitimacy towards the anti-doping policies, as an effective anti-doping system is dependent upon being perceived as legitimate (Donovan et al., 2002). The findings suggest that there is still much work to be done for anti-doping bodies to be perceived as legitimate. The two predominant factors that appear to effect perceptions of legitimacy are international harmonization and the overall effectiveness of the system. Allen and colleagues (2015) suggested that the development of a harmonized anti-doping system has progressed significantly under the auspices of WADA, yet this review indicates that this opinion has not developed amongst the global base of athletes. This incongruence between actual organisational standards and the implemented version experienced when competing is critical for decision makers to understand. Whilst athletes may not question the purpose of anti-doping rules (*doing the right thing)*, perceived legitimacy may be compromised by the way rules are applied in practice (*doing it in the right way;* Qvarfordt, 2019). Particularly, better transparency regarding procedures and outcomes may strengthen legitimacy perceptions. Without paying attention to these potential differences, anti-doping organisations may cause a larger de-legitimation among athletes (Efverstrom et al., 2016a; Overybe, 2016; Qvarfordt, 2019; USADA, 2017).

Twenty-five of the studies included in this review utilised quantitative methodologies, however, none developed or used a standardised anti-doping legitimacy specific measure. Legitimacy when directly measured was not the main focus of the majority of these studies, with a small number of items relating to legitimacy included as sections within larger surveys. However, in 2015, specific legitimacy focussed questions were offered in the WADA survey pack for Anti-Doping Organisations (Donovan et al., 2015), with one included study utilising these items (Al Ghobain, 2019). Given the date of publication of this survey resource and the studies included in this review, its apparent lack of use is understandable. However, a lack of utilising one standardised measure exists, meaning that comparison and synthesise of research findings is problematic. Developing such a measure - which may be validated and utilised internationally to provide more applicable and effective findings and feedback on the anti-doping system – is warranted.

Additionally, six of the included studies utilised qualitative measures to elicit athlete perceptions of anti-doping efforts and the legitimacy of the organisations who govern and control the anti-doping system. Qualitative results were found to be consistent with the quantitative findings.

Tyler (1990) suggested that an authority's legitimacy is influenced by three dimensions of justice; a) distributive justice (the fairness of the outcomes of a system), b) procedural justice (the fairness of the process) and c) interactional justice (the fairness of the interpersonal treatment). However, a further dimension of justice, restorative justice, and the aspects of the anti-doping system which may contribute, is missing from the literature on anti-doping legitimacy. This restorative justice is the process involving primary stakeholders in determining how best to repair the harm done by an offense. This process has been highlighted by athletes as a significant one which is missing from the current anti-doping procedures (Gleaves & Christiansen, 2019). Thus, further research including restorative justice as part of the legitimacy of the anti-doping system is called for.

An additional direction for future research should be to investigate the role of anti-doping education in improving legitimacy perceptions. In particular, what athletes believe of current anti-doping education efforts and how they believe this could be improved. Gatterer and colleagues (2020) suggested that "concrete guidelines defining multifaceted, values-based education, and best practice examples" (p. 228) be developed to assess the potential benefits and effectiveness of such an approach to anti-doping education. This is particularly important as Westmattelmann and colleagues (2018) found that despite education programs being perceived to be moderately effective at keeping athletes from doping, they are less effective than control or punishment measures. A shift from deterrence to education may increase the athletes' perceptions of legitimacy and effectiveness, in addition to actual effectiveness of anti-doping organisations.

From the history of anti-doping, the continuity in problem identifications and changes in policies and procedures to address the problems is evident. Applying the 'wicked problem' concept (Rittel & Webber, 1974), or rather its contemporary version of problematicity and political distance (Turnbull & Hoppe, 2019), this ever-evolving improvement process will likely characterise anti-doping in the years to come (Kazlauskas, 2014; Viret, 2019), continuously influencing legitimacy perceptions along the way. A wicked problem, characterised as a plausible description by Rittel and Webber (1974) of problematic situations policy makers often confronted, has no definite endpoint. Problems are wicked because they are difficult or impossible to solve owing to incomplete information, contradictory and changing requirements which are often (1) difficult to recognize and (2) not even apparent until after a solution is put in place. Thus, the term 'wicked' in this context refers to doping being resistant to definite resolution and having tendencies for emerging new issues once an anti-doping measure is put in place. Turnbull and Hoppe (2019) operationalise 'wicked problems' as a continuum of higher and lower degree of 'problematicity' or 'structuredness' of problems and substitute the 'wicked' label with a more practically relevant '*political distance*'. The latter, they argue, is "a second, inherent dimension of policy problems, …characterized as the distance between actors in terms of ideas/values, institutions and interests, pursued through practices" (Turnbull & Hoppe, 2019, p333). The distance between stakeholders in a policy process (e.g., athletes, organisations with vested interest in sport, and organisations tasked with anti-doping) is born out of differences in values, economic and political interests, institutional authority and diverse types of implementation practices. The political distance in doping problem is tangible in doping and anti-doping, emphasised by the increasingly vocal interest groups and the emergence of alternative anti-doping systems. Political distance, and any change therein, has a direct impact on perceived legitimacy of implemented policies. Therefore, athletes' and stakeholders' perceptions – in theory –

should be good indicators of how newly implemented measures and improvements to the existing policies and procedures are perceived as *proper*, *just* and *appropriate*.

Limitations

We acknowledge that this mapping review is most likely not as comprehensive as it could be for multiple reasons. Firstly, the literature search was limited to studies in the public domain and published or written in English. Whilst the field could certainly benefit from a broader international scope and capturing cross-cultural nuances, we did not feel competent in making a qualitative assessment for legitimacy categories in other languages. Secondly, as we described in the method section, we faced considerable difficulties in both identifying and categorising empirical research. The former was due to the fact that almost half, 18 of the 39 eligible studies were not tagged for legitimacy therefore database search in titles, abstracts and keywords failed to identify them. Among the included studies, two were conference abstracts and six were research reports (four NADO reports, one WADA research project report and one independent report by Global Athletes). These presented a great deal of variety in terms of reported details and methodological rigour, which must be acknowledged as a limitation to the findings of this review. Because the included studies defined 'elite athlete' in various ways, ranging from high school competitors to Olympic level athletes, generalisability of the findings for the elite athlete population is compromised to some degree. In due course, when research on anti-doping legitimacy perceptions has gained sufficient mass, separating studies by competitive level will afford a more nuanced analysis.

With a few exceptions, those studies that identified with anti-doping legitimacy did not differentiate between the different legitimacy components. The latter required developing a conceptual framework and definition and applying these simultaneously. Thirdly, anti-doping rules and processes present a complex system, with no objective and measurable indicators for effectiveness. Even studies that included all three anti-doping legitimacy components did not capture the full spectrum of reasons for, implementation and perceived effectiveness of the anti-doping rules and regulations, nor made that assessment in situational context.

Conclusion

The findings of this review identify how athletes' perceptions of the anti-doping rules and organisations can contribute to their perceived legitimacy of the anti-doping system. Despite the importance of legitimacy and the twenty years since WADA was established, there is still a sparse amount of bespoke research in this area. Further research should be conducted to develop a better understanding of the relationships between perceived legitimacy and intentions to dope or be a 'clean' athlete. To facilitate this process, valid and reliable survey tools which examine legitimacy are required.

From the athletes' views presented here, an obvious strategy for improved perception of systemic anti-doping legitimacy is making it more effective and equal, ensuring that not only the rules and regulations are harmonised at the global level but that their implementation is harmonised as well. Furthermore, there is a need for better communication from organisations responsible for anti-doping to highlight progress with detection and introducing greater transparency in testing and selection for testing. Mechanisms to support athletes who were victims of doping along with direct support for 'clean' athletes to manage doping control requirements, would further enhance positive perception of anti-doping legitimacy.

This mapping review also highlighted the ambiguity that surrounds legitimacy perception as a psychological concept, particularly for distinguishing between being 'just and being 'appropriate. Moving forward, results from this review will help formulating survey questions for empirical studies as well as data analysis from qualitative interviews within a sound theoretical framework for anti-doping legitimacy perceptions. This, in turn, will facilitate meta-analysis and meta-synthesis of anti-doping legitimacy perception of athletes' and their entourage in the future.

The outcome of this systematic mapping review left doubt that the legitimacy perception concept is benefitting from receiving growing attention in anti-doping research. We consider this review as a start rather than a conclusion. Future studies will benefit from a clearer understanding of each anti-doping legitimacy components as well as contextual and cross-cultural limitations in surveys; and will assist devising more targeted and specific research tools.

Part 2: Measuring anti-doping legitimacy perception: Scale development

Some studies included in the systematic mapping review utilised quantitative methodologies. However, none of these developed or validated an anti-doping legitimacy specific measure. Items relating to legitimacy were included as sections within larger surveys, with relatively few number of items compared to other concepts and areas of interest. This lack of validated measure means that comparison and synthesise of research findings is problematic.

Without understanding the validity and reliability of a measure it is difficult to ascertain the validity of the findings. Thus, it seems valuable to the progression of the anti-doping legitimacy research topic to develop such a measure which may be validated and utilised internationally to provide more applicable and effective findings and feedback on the anti-doping system. To address this hiatus, we utilised the findings from the review develop a psychometric scale to measure anti-doping legitimacy perception.

Challenges to legitimacy research in general, and in applications to anti-doping revolves around conceptualising and measuring legitimacy. The unique aspect of anti-doping legitimacy lies in:

1. the international aspect of sport competition and thus the global harmonisation of anti-doping; and the multiple stakeholders (athletes, media, entourage and general public), each with conceivably different dimensions of anti-doling legitimacy.
2. The irresolvable contradiction between the striving for success and the ideas of "fair play" (Bette & Schimank, 2006; Petróczi et al., 2017); Christiansen & Møller, 2016)

Existing legitimacy measures can be used for validation of the new scale. In WADA Social Science Research Package for Anti-Doping Organisations (Donovan et al, 2015), nine anti-doping legitimacy measure items are offered. These items are tapping into three legitimacy components: (1) distributive justice, which is the fairness of the outcomes of a system; (2) procedural justice, which the fairness of the processes; and (3) interactional justice, which is the fairness (Appendix B).

At three major international sport events, a brief measure of perceived anti-doping legitimacy was used. This measure comprised of three or four questions, each tapping into a specific components of anti-doping legitimacy: normative component (shared values and motives) and procedural aspects (fair process and outcome) (Table 4). These questions were:

1. Current anti-doping rules are fully justified because they protect clean sport.
2. Current anti-doping rules are effective in protecting clean sport.
3. Current anti-doping rules are fair to all athletes.
4. Current anti-doping rules are implemented equally in all sports and all countries.

Participants were instructed to rate their agreement on a Likert-scale (strongly disagree, disagree, neither agree or disagree, agree and strongly agree).

We also benefitted from two small-scale studies that helped us to formulate the items for the new scale as well as testing the short 3-item measure:

1. First a pilot study was carried out among sport and exercise science students (n = 48) with a limited set of legitimacy perception items empirically. The aim of this study was to test whether athletes perception of anti-doping legitimacy can be captured in a meaningful way (i.e., if athletes are able to make a nuanced judgement on anti-doping legitimacy which process assumes knowledge on rules, implementations and their perceived effectiveness). A brief summary of this work is provided in Appendix C.
2. The second study utilised the short three-item measure of legitimacy alongside with attitude, morality, trust, and normative obedience. Data were collected among UK university students (n = 158) with some level of involvement in sport, either as athletes or via studying sport-related subjects for a degree. The results from this study are available in Appendix D.

Legitimacy as psychological construct and its related concepts

In order to provide conceptual clarity on the psychological concept of anti-doping legitimacy, and because of the sparsity of literature regarding perceived anti-doping legitimacy, an examination of potentially related concepts is warranted. This discussion would provide clarity as to how cognate areas and legitimacy are related yet distinguishable, furthering our understanding of legitimacy and increasing opportunities to improve perceptions of legitimacy. Cognate areas related to an athlete's perceptions of legitimacy include: attitude, morality, trust and trustworthiness and compliance/conformity/normative obedience (shared social expectation). The hypothesised relationship between these constructs is depicted in Figure 5.

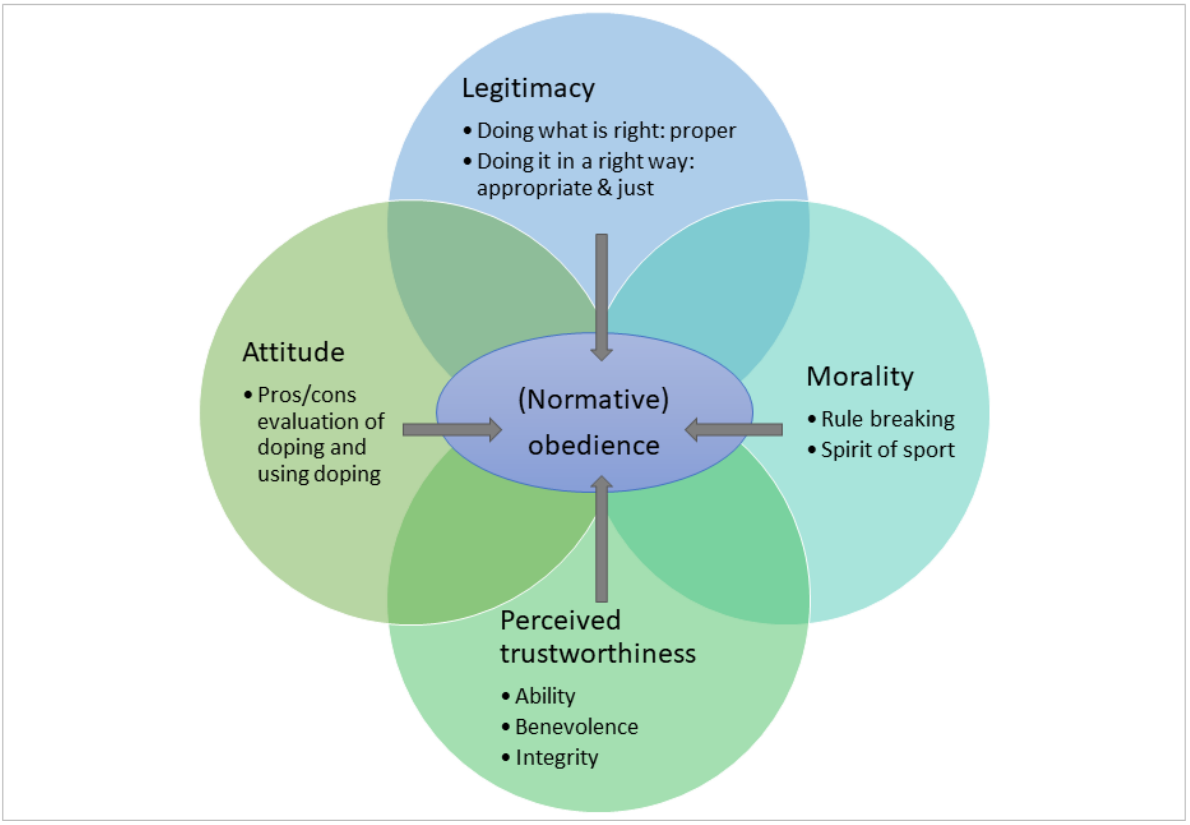

Figure 5: Mapping of the hypothesised relationship between legitimacy and cogent concepts

Attitudes. Attitudes refers to an individual's evaluative reaction of an entity which can be exhibited through their beliefs and behaviour. Measuring athletes' attitudes towards doping use, and the effect of this upon intentions to dope is important as both the valence and intensity of attitudes have the capacity to motivate (Petróczi & Aidman, 2009), and are likely to predict doping related behaviour (Lucidi et al., 2008). Positive attitudes towards performance enhancing substance use are a positive correlate and significant predictors with doping intentions and behaviours (Judge, Beller, Petersen, Lutz, Gilreath, Simon, & Judge, 2012; Ntoumanis et al., 2014). Indeed, Petróczi and Aidman (2009) found a positive association between elevated attitude towards doping and elevated doping use. Those with prior doping use experience have more elevated attitudes than those without this experience (Muwonge, Zavuga, & Kabenge, 2015). Jalleh and colleagues (2013) found a small significant effect of athlete perceptions of legitimacy on their attitude towards performance enhancing substance use. However, Gucciardi, Jalleh and Donovan (2011) found a small non-significant effect of legitimacy on attitude to doping and use of doping. Thus, it is important within the area of anti-doping legitimacy to clarify the relationship between perceived legitimacy and attitudes toward performance enhancement and anti-doping organisations.

Morality. In addition, an athlete's morality, moral conviction and moral disengagement may have an influence upon both doping use and perceived legitimacy of anti-doping rules and organisations. Whilst legitimacy is a perceived obligation to authorities and their actions, "moral values are personal standards to which people attempt to align their own behavior" (Tyler, 2006, p. 390). Athlete morality has a negative association with doping intent and behaviours (Ntoumanis et al., 2014) and has a significant association with legitimacy itself (Gucciardi et al., 2011). Likewise, moral conviction is a significant predictor of intent to use performance enhancing substances (Judge et al., 2012) and moral disengagement contributes directly to a higher likelihood to dope (Ring & Kavassanu, 2018). Kelman and Hamilton (1989) propose that when an authority is viewed as legitimate, individuals will suspend their normal motivations to keep their behaviour in line with their moral values, and in these settings, it is only legitimacy that shapes behaviour. These differing variables of morality may influence an athlete's perceptions of legitimacy of anti-doping organisations and rules through their significant interaction with legitimacy (Gucciardi et al., 2011) to predict attitudes and intention to doping use.

Trust and trustworthiness. One critically important cogent area of research which may inform that of legitimacy of anti-doping rules and organisations is that of trust and trustworthiness. Trustworthiness is an attribute of an object of one's trust, whereas trust is an attribute of the individual about the object in question. As such, trustworthiness is more related to perceptions of legitimacy, and trust to actions and compliance. In this context, these terms relate to the athlete's trust and perceptions of trustworthiness of both opponents and sports federations and anti-doping agencies (Dreiskamper, Poppel, Westmattelmann, Schewe, & Strauss, 2016). Firstly, an athlete trusts their opponents to comply with the anti-doping rules and to try not to evade doping tests or sanctions, which implies a risk as athletes cannot control the actions and behaviours of other athletes. In turn, an athlete assesses the trustworthiness of sport federations and anti-doping agencies to develop a sense of trust. An evaluation of these organisations is made by judging whether it is effective in controlling doping, and the athlete will weigh the risks and benefits of doping. Dreiskamper and colleagues (2016) suggest that perceptions of trust rely on the provision of fair conditions, with the ability, integrity and benevolence of organisations as antecedents of trust. This focus on fair, appropriate and effective procedures inherently provides an

association with the components of legitimacy presented in the results of the current review. Thus, the relationship between athlete trust and perceptions of legitimacy may inform our current understanding of both areas, and provides a potential avenue for further research.

Obedience, Compliance and Conformity.

The perception of legitimacy of rules and organisations, along with the cogent areas of trust and trustworthiness, attitudes towards performance enhancement use and moral values influence, in differing ways, an individual's conformity and obedience to follow the rules of authoritative organisations. In the anti-doping setting, it is NGBs, NADOs and WADA who possess this authority, and require the compliance of athletes in order to compete in sport. When people perceive authorities as legitimate, they are authorized to make decisions about what is right and wrong (Kelman & Hamilton, 1989). Tyler (2006) suggests that "the ability to secure compliance is viewed as the litmus test of authority" (p.379). This indicates that without securing compliance to the organisations rules and procedures, it may not be viewed as effective in achieving its aims. This may in turn retrospectively influence perceptions of legitimacy, and future compliance due to reduced perceptions that the actions of the anti-doping system are fair, just and appropriate (Tyler, 2006).

At this point, it is important to make a distinction between obedience, compliance and conformity. We conceptualise obedience as normative (or expected) obedience, reflecting a social support for anti-doping. As such, it is expected to be closely related to the normative component of anti-doping legitimacy. In contrast, concepts of conformity and compliance are critical to the understanding of legitimacy and how perceived legitimacy may lead an individual to comply with the rules and processes of anti-doping organisations. Conformity relates to the shared expectations about how an individual or a group ought to behave in distinct social settings and situations and is a voluntary behaviour aligned to social norms and situations (Constant, Ramstead, Veissiere & Friston, 2019). Compliance 9sometimes referred to as obedience but to avoid confusion with our normative obedience, we refer to the behavious as 'compliance' and reserve 'obedience' for normative expectation of how others should behave) is however a form of social influence elicited in response to direct orders from an authority figure (Gibson, 2019). How individuals conform and obey the rules and processes of organisations are directly associated with how legitimate perceptions may influence an athlete's behaviour towards the anti-doping system and its organisations.

From the cognitive point of view - if the conceptualisation depicted in Figure 5 stands – obedience expected from others is a good measure of the dynamics between Trust/Trustworthiness and Legitimacy. Voluntary compliance (as opposed to compliance to avoid threats) and conformity (to rules and behavioural conducts by a reference group) are behavioural outcomes of Legitimacy perception, Trust/Trustworthiness, Normative obedience, attitude and morality. Note that at the behavioural level, compliance is also a function of reasons for doping, that is, it is easier to be compliant if there is no reason for noncompliance [doping]) .

Furthermore, we posit that perceived legitimacy is not the same construct as trust or perceived trustworthiness of anti-doping organisations but they are closely related. Trust cannot be operationally defined (in this context) without the ingredients of legitimacy: legitimacy is what organisations set out to do (and should be successful to keep sport clean); trust is an anticipation of what organisations will actually do in a specific context. Trust is an attribute of the person making decisions about the 'object in question'

under uncertainty. Trust and trustworthiness are related: the more the object perceived to be trustworthy, the more it can be trusted (that is, trustworthiness reduces the uncertainty inherent in trust).

Trustworthiness is an attribute of the 'object' (an organisation or a person) of one's trust. As such, trustworthiness is more related to perceptions of legitimacy (i.e., an organisations' capabilities and intentions in principle). Trust is expected to be more related to actual practice, and thus compliance whereas trustworthiness is expected to be related to normative expectations (obedience).

Anti-Doping Legitimacy Perception (ADoLP) scale: Item generation

We used the concept mapping depicted in Figure 5 to generate potential items for the anti-doping legitimacy perception scale. The items are listed in Table 4. Items in bold are from the preliminary study, now sorted into 3 subscales on a conceptual basis using Tyler's work (2006) and our systematic mapping review to capture normative legitimacy under the label "Doing what's right" (shared priorities and motives [1. proper]); and procedural legitimacy under the label "Doing it in a right way" (fair [2. just] and effective [3. appropriate]) (Woolway et al., 2020). The new items are based on the literature on trust / legitimacy (Jackson & Gau, 2016; Jackson, 2015).

Table 5: Items to measure anti-doping legitimacy perception, normative obedience, morality and trust. Bold denotes the initial 13 items; items in italics have been eliminated during testing.

Construct (Tyler's taxonomy)	Definition	Underpinning influence	Items
Proper	Normative alignment (shared priorities and motives) Anti-doping rules are justified on some important values, e.g., values of sport. Anti-doping rules are to protect athletes and integrity of sport.	Values of Sport	***1. Anti-doping rules are fully justified.***
			7. Anti-doping strategies include helping accidental dopers and offenders to prevent future offenses.
			16. Anti-doping strategies promote clean sport culture at all ages and levels.
			17. Values of the 'spirit of sport' are evident in the Anti-Doping Code.
			18. The Anti-Doping Code plays a critical role in protecting the 'spirit of sport'.
			19. Protecting the 'spirit of sport' justifies the anti-doping efforts.
			25. The Anti-Doping Code protects athletes' health effectively.
			26. The Anti-Doping Code sufficiently assures that sport results and records are achieved without drugs.
Just	Fair process to all All athletes are subject to testing	Procedural justice	***2. Values-based anti-doping incorporates all stakeholders (e.g., athletes, coaches, doctors, administrators and other support personnel).***

	Responsibility is shared among stakeholders Rule-breakers are punished. Punishment is proportionate. Costs and burden of doping control are shared among stakeholders. Athletes are supported.		***3. Anti-doping strategies in are clearly communicated to all stakeholders.***
			5. Anti-doping processes and procedures treat all athletes equally and fairly.
			6. Dealings with doping cases are transparent in all countries.
			8. Punishments are proportionate to the gravity of the doping offence.
			9. Resources to protect clean sport are allocated appropriately.
			14. *Anti-doping is effectively coordinated across all countries to create clean sport culture globally.*
			15. The Anti-Doping Code ensures global compliance effectively.
			20. The burden of doping control is shared fairly among those involved in competitive sport.
			22. Anti-doping strategies include sufficient support for athletes to comply with doping control.
			21. The Anti-Doping Code has sufficient provisions for helping athletes to return to sport after a doping ban.
			37. *The Anti-Doping Code makes the shared obligations and responsibilities of the athlete support personnel (coaches, parents, nutritionists, physicians) clear.*
Appropriate	Fair outcome to all Rules effectively do the job (catching rule-breakers). Testing is robust against manipulation and false positives. All athletes are supported via education to prevent anti-doping rule violations.	Distributive justice	***4. Anti-doping strategies are coherent and support each other.***
			10. Drug testing in sport meets the most rigorous industry standards.
			11. *Current anti-doping strategies are effective to protect clean sport.*
			12. Current drug tests are effective to correctly identify prohibited substances, if taken.
			13. *Current drug testing protocol is sufficiently robust against manipulation.*
			23. Anti-doping strategies include sufficient support for athletes to cope with a doping-related ban.
			24. Anti-doping education equips athletes with skills necessary to avoid doping.

			27. Anti-doping is sufficiently robust to assure for sport fans about clean sport performance.
			28. Anti-doping is sufficiently robust to assure sponsors about clean sport performance.
			29. The athlete selection strategy for doping control is appropriate to keep the important sport competitions clean.
			32. There are sufficient safeguards against false positives (i.e., having positive doping test without using doping).
			33. Doping control procedures make cheating or avoiding the test impossible.
			34. Values-based education effectively prevents doping.
			35. *Doping control rules and procedures assure athletes about their competitors' clean status.*
			36. The Anti-Doping Code gives equal emphasis to values-based prevention and testing-based doping control.
			30. The number of doping tests is appropriate to keep the important sport competitions clean.
			31. The Anti-Doping Code sufficiently deals with countries and/or organisations if they are non-compliant with the Code.
			38. *Expectations for the athlete support personnel (coaches, parents, nutritionists, physicians) are fully justified.*

Study 1

Participants

Participants were 749 individuals (M=452, F=277, 20 missing; mean age of 27.47 years , SD=14.972) from Germany (269), Greece (187), Italy (187) and Russia (106)[3]. These four countries were selected for recruitment of participants as these represent a range of comprehensiveness of National Anti-Doping Organisations efforts and systems (Gatterer et al., 2020). Of these countries, Germany boasts a comprehensive anti-doping programme addressing a wide spectrum of potential contributing factors, Russia has a strong programme related but limited to anti-doping code compliance, whereas Greece and

[3] This project was conducted in conjunction with an IOC-funded project called LEGIT, investigating the factors contributing to active support from athletes for anti-doping. The participating countries in this project were Germany, Greece, Italy, Serbia and Russia. Therefore in this project, we worked with the same countries and same project partners. Data for this project were collected separately from the LEGIT project.

Italy have limited information-based programmes related to code compliance only. In addition, these countries are represented by members of the research team and therefore personal communication and connections provided a channel for recruitment.

Participants from the four countries included currently active athletes (475), those retired from competitive sport (113), and those involved in non-competitive sport (120). Retired athletes had been retired for an average of 5.04 years (SD=8.293). The responding participants had competed at Olympic (9), international (53), national (59), junior (36), state (174), club (241), and amateur (119) levels. In total, thirty-four different sports were represented within the sample. Approximately nine percent (83) of the sample had previous experience of being tested for doping substances with ratings of this experience. Two hundred and eleven participants reported personally knowing someone who had previously used prohibited performance-enhancing substances.

Measures

For empirical testing of the first version of ADoLP, we used a battery of psychometric scales alongside the new anti-doping legitimacy perception items.

Legitimacy. Thirty-eight potential items for measuring anti-doping legitimacy perception was administered. Items are presented in Table 5. Responses were recorded on a six-point Likert-type scale ranging from strongly disagree (1) to strongly agree (6).

Cogent social cognitive measures. Items for the cogent concepts identified in Figure 4 are presented in Table 6. Validated scales are marked with an asterisk.

Table 6: Social cognitive assessments co-administered with the legitimacy items. R denotes reversed scoring.

Concept	Ways to measure	Related Items
Normative Obedience Rating scale: *Strongly Agree* *Agree* *Slightly agree* *Slightly disagree* *Disagree* *Strongly disagree*	Normative alignment (Shared priorities & motives)	1. It is the athlete's duty to obey, even if he/she personally disagrees with the content of the Anti-Doping Code.
	Fairness (procedural and distributive)	2. It is the athlete's duty to obey, even if he/she personally disagrees with how the anti-doping rules are implemented.
	Effectiveness	3. It is the athlete's duty to obey, even if he/she personally thinks that the anti-doping procedures are not effective to keep doping out of sport.
	Trust	4. It is the athlete's duty to obey, even if he/she personally has no trust in the anti-doping organisation that they will deal with all athletes appropriately.
	Trustworthiness	5. It is the athlete's duty to obey, even if he/she personally thinks that organisations involved in anti-doping are not capable of controlling sport.

		6. It is the athlete's duty to obey, even if he/she personally thinks that organisations involved in anti-doping have other priorities than the athletes' welfare.
		7. It is the athlete's duty to obey, even if he/she personally thinks that organisations involved in anti-doping do not deal fairly with all athletes.
Trust - specific (must have an element of uncertainty; predicted action in the future) *Refs: Mayer et al., 1995; Mayer & Davis, 1999* Response options: *Not likely at all* *Unlikely* *Likely* *Very likely*	Normative alignment (Shared priorities & motives)	1a. If an athlete is reported on for having used doping, how likely it is that the organisations responsible for anti-doping in your country will take appropriate actions? 1b. - How likely it is that all other WADA-signatory countries will take appropriate actions?
	Fairness (procedural and distributive)	2a. If an athlete is involved in doping in your country, how likely it is that he/she will be treated exactly the same as any other athlete in your country? 2b. - How likely it is that he/she will be treated exactly the same as any other athlete in the word under the anti-doping rules? 3a. If an athlete is involved in doping in your country, how likely it is that he/she will be sanctioned appropriately? 3b. - How likely it is that all other WADA-signatory countries will take appropriate actions?
	Effectiveness	4a. If an athlete is involved in doping in your country, how likely it is that he/she will be caught? 4b. - How likely it is that he/she will be caught in any other WADA-signatory countries? 5a. If an athlete completes anti-doping education in your country, how likely it is that he/she will be well-equipped to avoid doping? 5b. - How likely it is that he/she will be well-equipped if he/she completes the anti-doping education in any other WADA-signatory countries?
General trust: beliefs about implementation of anti-doping rules and doping control measures Response options: *Strongly Agree* *Agree* *Slightly agree* *Slightly disagree*	Normative alignment (Shared values and motives)	1a. Protecting clean sport is more important in my country than winning medals. 1b.Protecting clean sport is more important in all WADA-signatory countries than winning medals. 2a. Organisations responsible for anti-doping in my country stand up for the same values about sport as me. 2b. Organisations responsible for anti-doping in other WADA-signatory countries stand up for the same values about sport as organisations in my country.

Disagree *Strongly disagree*		3a. Organisations responsible for anti-doping in my country have the same sense of duty to keep sport clean as me. 3b. Organisations responsible for anti-doping in other WADA-signatory countries have the same sense of duty to keep sport as organisations in my country. 4a. I support the way organisations responsible for anti-doping in my country fulfil their duties. 4b. I support the way organisations responsible for anti-doping in other WADA-signatory countries fulfil their duties.
	Fairness (procedural and distributive)	5a. The athlete selection for doping testing in my country is not justified clearly. (R) 5b. The athlete selection for doping testing in other WADA-signatory countries is not justified clearly. (R) 6a. The sanctions imposed on athletes for doping in my country are not appropriate. (R) 6b. The sanctions imposed on athletes for doping in other WADA-signatory countries are not appropriate. (R) 7a. Sometimes doping tests in my country are conducted unprofessionally. (R) 7b. Sometimes doping tests in other WADA-signatory countries are conducted unprofessionally. (R)
	Effectiveness	8a. The number of doping tests conducted in my country is not sufficient to keep doping out of sport. (R) 8b. The number of doping tests conducted in other WADA-signatory countries is not sufficient to keep doping out of sport. (R) 9a. An athlete in my country can never be tested positive without having used doping. 9b. An athlete in other WADA-signatory countries can never be tested positive without having used doping. 10a. An athlete in my country can avoid being tested positive if he/she used doping. (R) 10b. An athlete in other WADA-signatory countries can avoid being tested positive if he/she used doping. (R)
Perceived trustworthiness* *Refs: Dreiskaemper et al., 2016*	Ability	1. All organisations involved in anti-doping are very capable of performing its job in anti-doping. 4. I feel very confident about anti-doping organisations' skills regarding controlling doping in sport. 7. All organisations involved in anti-doping are well qualified in all parts of anti-doping.
	Benevolence	2. All organisations involved in anti-doping are very concerned about the athletes' welfare.

		5. Athletes' needs and desires for a fair competition are very important to all organisations involved in anti-doping. 8. All organisations involved in anti-doping really look out for what is important to the athletes.
	Integrity	3. All organisations involved in anti-doping have a strong sense of justice. 6. All organisations involved in anti-doping try hard to be fair in dealing with the athletes. 9. Sound principles seem to guide all organisations' behavior regarding anti-doping.
Morality *REF: Donovan et al., 2015* Response options: *Strongly Agree* *Agree* *Slightly agree* *Slightly disagree* *Disagree* *Strongly disagree*		1. Deliberately using doping to improve performance is morally justifiable in some circumstances.* 2. Not reporting doping - if known - is morally justifiable in some circumstances. 3. Deliberately assisting someone to use doping is morally justifiable in some circumstances. 4. Covering up for positive doping tests to protect the reputation of the sport or the athlete is morally justifiable in some circumstances. 5. Covering up for positive doping tests to protect competitive advantage is morally justifiable in some circumstances.
General (moral) attitude* *Ref: Short form of PEAS (8 items), Petroczi & Aidman, 2009; Folkerts et al., 2020* *German version exists* Response options: *Strongly Agree* *Agree* *Slightly agree* *Slightly disagree* *Disagree* *Strongly disagree*		1. Doping is not cheating since everyone does it. 2. The health risks related to doping are exaggerated. 3. Doping is not necessary to be competitive. (R) 4. There is no difference between drugs, fibreglass poles and speedy swimsuits that are all used to enhance performance. 5. Legalising performance enhancement would not be beneficial for sports. (R) 6. Doping is an unavoidable part of a competitive sport. 7. Only the quality of performance should matter, not the way athletes achieve it. 8. Athletes should feel guilty about breaking the rules and taking performance enhancing drugs. (R)

Intention. Participants' intention regarding anti-doping rule violations was measured with 5 items related to doping, via the likelihood of reporting of doping, covering up of doping, or assisting in doping utilising the stem "all things considered, how likely are you in the future to".

Stem: All things considered, how likely are you in the future to…

5. Deliberately use doping to improve performance
6. Not report doping, if known
7. Assist someone to use doping
8. Cover up for a positive doping test to protect the reputation of the sport or the athlete.
9. Cover up for a positive doping test to protect competitive advantage.

Responses were recorded on a 4-point Likert-type scale from ranging from Not likely at all to Very likely.

Demographics. Participants also responded to a number of demographic questions relating to their nationality, gender, age, sport, current competitive status (active athlete, retired from competitive sport, or non-competitive) previous experience of doping testing, competitive level (Olympic, international, national, junior, state, club, or amateur) and personal knowledge of opponent doping.

Procedure

Where validated language version was not available, the survey pack was translated to Greek, German, Italian and Russian using translation-backtranslation methods. Data were collected independently by each partner in their respective countries using online survey link or paper and pencil format. Ethical approval was obtained locally.

Results

Through a series of exploratory factor analysis (principal component analysis), the number of items was reduced first to 19, then further reduced to 15. The items are presented in Table 7.

Table 7: Final items of the ADoLP instrument (15 items; *additional 4 potential items in Italics*)

Legitimacy aspect	Item
Normative anti-doping legitimacy (shared values and motives)	Anti-doping strategies promote clean sport culture at all ages and levels
	Values of the 'spirit of sport' are evident in the Anti-Doping Code
	The Anti-Doping Code plays a critical role in protecting the 'spirit of sport'
	The Anti-Doping Code protects athletes' health effectively
	The Anti-Doping Code sufficiently assures that sport results and records are achieved without drugs
Procedural anti-doping legitimacy: Fair process	Anti-doping processes and procedures treat all athletes equally and fairly
	Punishments are proportionate to the gravity of the doping offence
	Resources to protect clean sport are allocated appropriately
	The Anti-Doping Code ensures global compliance effectively
	The burden of doping control is shared fairly among those involved in competitive sport
	Anti-doping strategies include sufficient support for athletes to comply with doping control.

	The Anti-Doping Code has sufficient provisions for helping athletes to return to sport after a doping ban.
Procedural anti-doping legitimacy: Fair outcome	Drug testing in sport meets the most rigorous industry standards
	Current drug tests are effective to correctly identify prohibited substances, if taken
	Anti-doping education equips athletes with skills necessary to avoid doping
	Values-based education prevents doping
	The Anti-Doping Code gives equal emphasis to values-based prevention and testing-based doping control
	There are sufficient safeguards against false positives (i.e., having positive doping test without using doping). *Doping control procedures make cheating or avoiding the test impossible.*

Internal consistency reliability

Once the final set of items had been selected reliability analysis was conducted. Cronbach's α internal consistency reliability estimates were calculated for the full survey. Cronbach's α for the total ADoLP scale was 0.96. In addition, the internal consistency reliability estimates for the three subscales were: $\alpha = 0.782$ (normative), $\alpha = 0.812$ (for fair process) and $\alpha = 0.937$ (for fair outcomes).

Validity

Face validity is evident in the highly specific items for the full scale; as well as for the subscales. After item testing and selection, the reduced set of items maintained good content validity, offering a sufficient cover of all key aspects of anti-doping legitimacy.

The revised version of the 15-item version of the ADoLP was used to analyse participant data for construct validity. As a basis to establish initial construct validity, convergent validity can be examined by demonstrating that the construct or measure of interest is similar to other constructs or measures in the study designed to measure the same phenomenon. Divergent validity aids the establishment of construct validity by demonstrating that the construct or measure of interest is different from other constructs in the study.

In order to assess convergent validity of the ADoLP, we conducted a correlation analysis, and computed a Pearson correlation coefficient between ADoLP total score and the 3-item LEGIT total score, as well as for the three subscales of each. High positive correlation between the two scales ($r = 0.87$, $p < 0.001$) was found and moderate to high positive correlations were found for proper ($r = 0.76$, $p < 0.001$), fair ($r = 0.91$, $p < 0.001$), and effective ($r = 0.85$, $p < 0.001$) subscales, suggesting convergent validity of the AdoLP scale.

Divergent validity of the ADoLP was examined by conducting a correlation analysis between the ADoLP and the other constructs measured in the study; attitude, morality, and trust. This analysis found a negative correlation with attitude to performance enhancement ($r = -0.005$, $p > 0.05$), morality ($r = -0.119$, $p < 0.01$) and athlete trust ($r = -0.201$, $p < 0.001$). These negative correlations suggest divergent validity.

Therefore, we have begun to establish construct validity of the ADoLP scale by determining both convergent and divergent validity.

Study 2

Measures

In the centre of our investigation is the link of perceived anti-doping legitimacy and behaviour, namely anti-doping rule following. Self-efficacy, which is defined as people's beliefs in their capabilities to exercise control over their own functioning and over events that affect their lives (Bandura, 1977) are developed through (i) mastery experiences, (ii) vicarious experiences, (iii) social persuasion and (iv) emotional states. For this study, we assume that anti-doping self-efficacy – athletes' confidence in their abilities to be anti-doping rule compliant – is determined by their (1) factual knowledge of the anti-doping rules, (2) personal experiences ('happiness') with anti-doping, (3) normative (expected) obedience and (4) attitude toward anti-doping rule compliance. This outcome measure is directly or indirectly influenced by a host of other factors such as (1) perceived anti-doping legitimacy, perceived trustworthiness of anti-doping organisations, general attitude toward doping and one's moral stance regarding doping.

The hypothesised relationships between these constructs are depicted in Figure 6. Measures for the components are detailed in Appendix E.

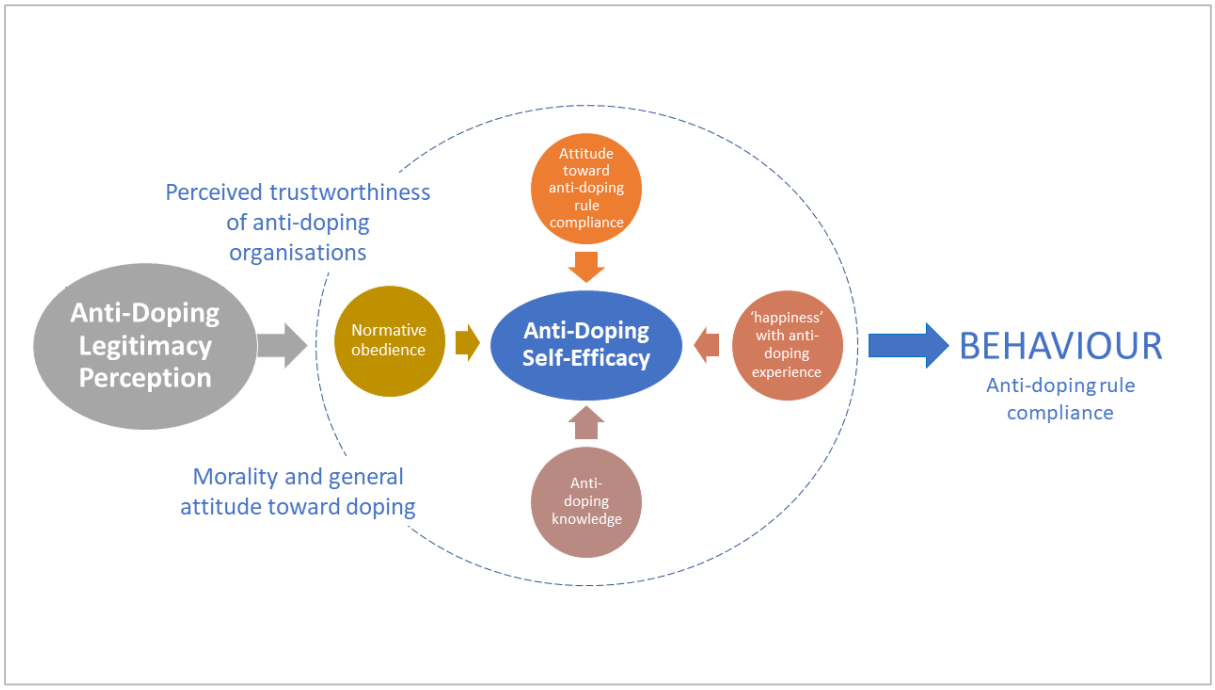

Figure 6: Hypothesised behavioural model of anti-doping rule compliance

Participants

Competitive athletes were recruited via a paid online site (Prolific) using a previously assembled dataset for identifying athletes. The survey link was only available to the invited participants with previously confirmed athlete status and level.

One hundred and five UK athletes participated in total (64% male, mean age = 26.68, SD = 8.625). They competed at international (17.1%), national (35.2%) or regional (43.8%) levels. Almost half of the respondents (46.2%) received formal anti-doping education, and 34% have been doping tested. In terms of personal experience with using performance-enhancing substances, 58.2% has never taken any, 35.8% has used not-prohibited substances (e.g., nutritional substances), 5.6% reported past use of prohibited substances.

Results

The average knowledge of anti-doping rules was around 50% mark (Mean score = 4.96, SD = 2.317), with test scores following normal distribution in the sample (Figure 7). Skipped questions were marked as zero (no point awarded). Of the 109 athletes, only 14 answered all 10 questions.

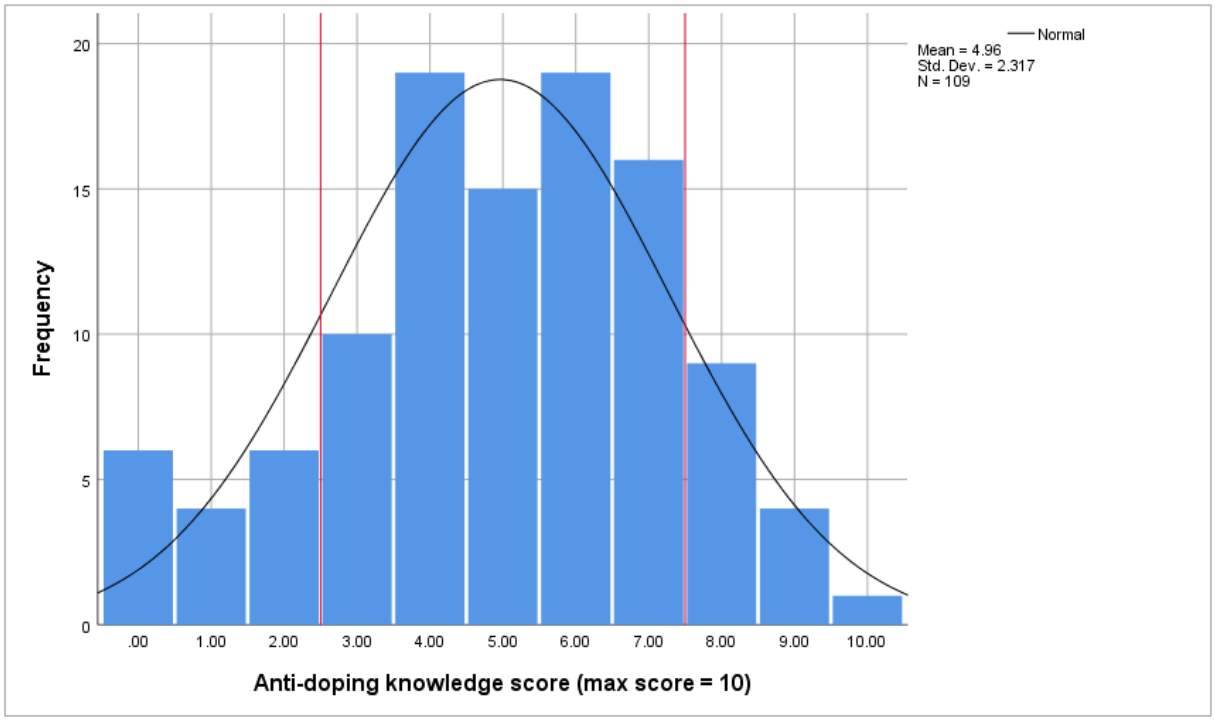

Figure 7: Distribution of anti-doping knowledge scores in the sample. Red vertical lines denote lower and upper quartile.

Reflecting of personal experiences with anti-doping, the majority of the respondents were reasonably happy with their experiences (Figure 8), marking their experiences on average at the 75% mark However, wide variance (SD = 27%) and a notable proportion below the 50% 'happiness' were noted.

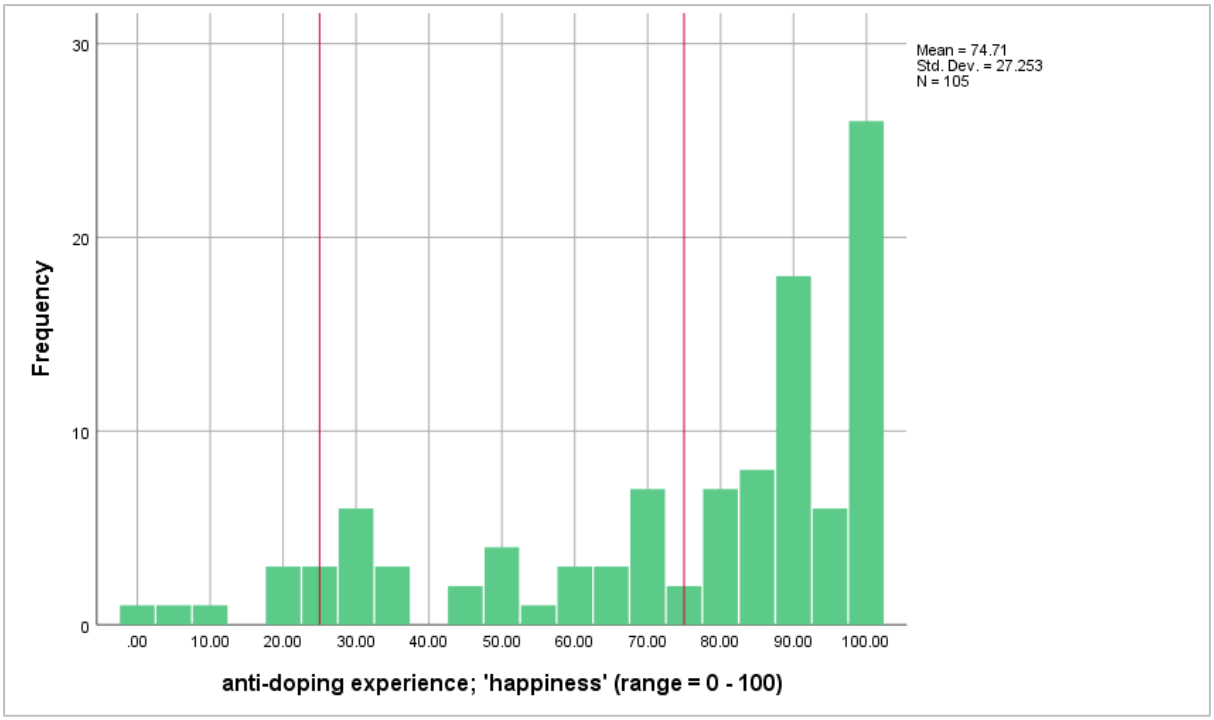

Figure 8: Distribution of respondents' rating scores of their experience ('happiness') with anti-doping. Red vertical lines denote lower and upper quartile.

No difference was observed in experience assessment ('happiness' with anti-doping) based on having anti-doping education ($t(103) = 0.014$, $p = 0.989$), but there was a difference – as expected – in knowledge scores, although the difference based on this sample did not reach statistical difference ($t(101.4) = 1.927$, $p = 0.057$). The same pattern was observed for behaviour (user groups) on anti-doping knowledge ($F(2,103) = 1.189$ $p = 0.309$ and experience ($F(2,102) = 0.107$, $p = 0.898$). The lack of statistical significance is likely to be caused by the combination of large variance and the relatively small sample size. Means and standard deviations are presented in Table 8.

Table 8: Differences in knowledge and experiences by anti-doping education and user groups; means (SD)

	Anti-doping education		Behaviour		
	Yes (n = 49)	No (n = 56)	None (n = 62)	Non-prohibited (n = 38)	Prohibited (n = 6)
Knowledge	5.53 (1.78)	4.74 (2.45)	4.84 (2.28)	5.42 (1.93)	5.83 (2.71)
Experience	74.75 (27.03)	74.68 (27.70)	75.71 (26.6)	73.61 (27.90)	71.67 (32.4)

We also asked participants why they follow clean sport behaviour. The dominant reasons were value-based (Figure 9). Athletes mostly said they adhered to clean sport rules because they wanted to achieve their absolute best withing the rule of sport, without cheating.

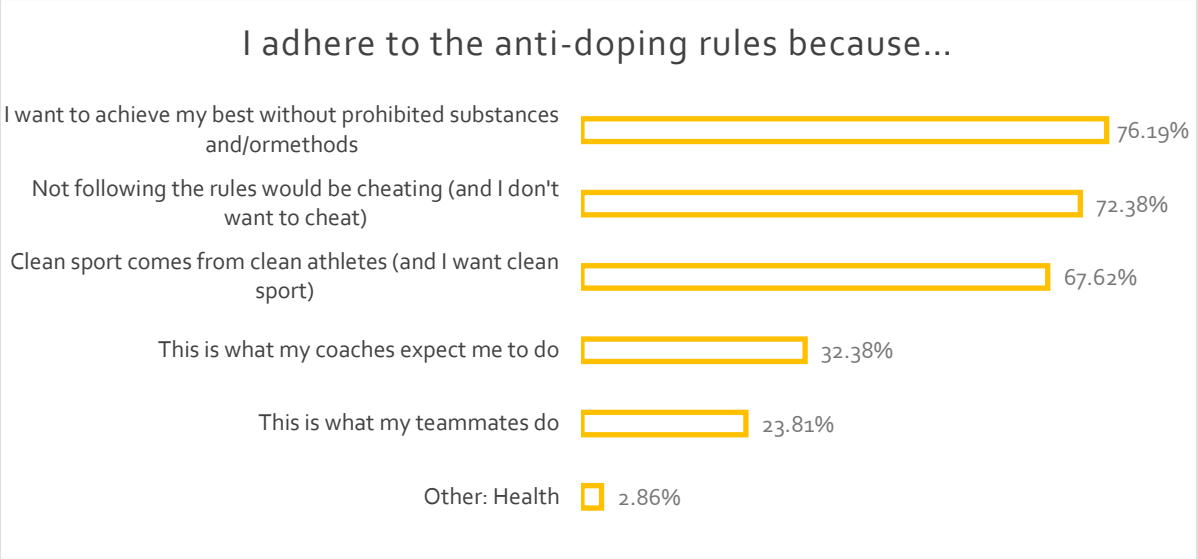

Figure 9: Reasons for clean sport behaviour (expressed as %, multiple selection was possible)

We also examined the scale structure by conducting exploratory factor (principal component) analysis and item-to total correlations.

Construct validity. To examine the ability to predict doping behaviour from perceptions of legitimacy it is necessary to establish predictive validity. This form of validity is assessed by demonstrating that the scores from one survey makes accurate predictions about the construct which you are trying to predict. To establish predictive validity of the ADoLP, correlation analysis was conducted between the ADoLP and both normative obedience and intention to dope (likelihood of committing anti-doping rule violation).

Using 15 items, the total explained variance in the data was 55.07%, with excellent sampling adequacy (KMO = 0.907) and factorability (Bartlett's Test of Sphericity χ^2 = 738.547, $p < 0.001$). Exploratory factor analysis suggests that the data contained two factors but five items loaded on both factors (Table 8).

Table 8: Rotated component matrix of the ADoLP scale items – 15 item version. (Principal component analysis with Varimax rotation; Factor loadings > 0.3 are in bold.)

Items	Factor 1	2
The Anti-Doping Code sufficiently assures that sport results and records are achieved without drugs*	**.756**	.228
The Anti-Doping Code ensures global compliance effectively	**.731**	.240
Drug testing in sport meets the most rigorous industry standards	**.729**	.251
The Anti-Doping Code gives equal emphasis to values-based prevention and testing-based doping control	**.725**	.257
The burden of doping control is shared fairly among those involved in competitive sport	**.692**	.284
Current drug tests are effective to correctly identify prohibited substances, if taken	**.684**	.284

Anti-doping processes and procedures treat all athletes equally and fairly	**.626**	.261
Punishments are proportionate to the gravity of the doping offence	**.587**	.194
Resources to protect clean sport are allocated appropriately	**.585**	**.381**
The Anti-Doping Code protects athletes' health effectively*	**.532**	**.525**
The Anti-Doping Code plays a critical role in protecting the 'spirit of sport'	.155	**.833**
Values of the 'spirit of sport' are evident in the Anti-Doping Code	.205	**.783**
Anti-doping strategies promote clean sport culture at all ages and levels	**.349**	**.688**
Values-based education prevents doping	**.304**	**.588**
Anti-doping education equips athletes with skills necessary to avoid doping	**.406**	**.542**

Note: Blue: normative legitimacy, Yellow: procedural legitimacy (fair process), Green: procedural legitimacy (fair outcome).

In Table 8, two items are marked with an asterisk. Although they were initially identified as normative legitimacy component, based on the results and re-consideration of its content, it appears that they tap into one's perception about the effectiveness (fair outcome) as well as shared motives for anti-doping. This might have caused by the qualifiers 'effectively' and 'sufficiently' that were included in the statements. To avoid future confusion, it is recommended that these qualifiers are removed from the statements (see Appendix E for the final version and recommended wording). Removing the cross-loading items and keeping only the 10 items making unique and distinct contribution to measuring anti-doping legitimacy perception, the explained variance in the data increased to 60.05% (KMO = 0.894, Bartlett's Test of Sphericity $\chi^2 = 435.815$, $p < 0.001$). Exploratory factor analysis suggests that the data still contained two factors (Table 9), one for procedural legitimacy (factor 1) and one for normative legitimacy (factor 2). If item #1 is rephrased without the qualifier word, this item might load on the second factor.

Table 9: Rotated component matrix of the ADoLP scale items – 10 item version. (Principal component analysis with Varimax rotation)

	Factor	
	1	2
1. The Anti-Doping Code sufficiently assures that sport results and records are achieved without drugs	**.775**	.193
2. The Anti-Doping Code gives equal emphasis to values-based prevention and testing-based doping control	**.766**	.143
3. Drug testing in sport meets the most rigorous industry standards	**.750**	.171
4. The Anti-Doping Code ensures global compliance effectively	**.735**	.215
5. The burden of doping control is shared fairly among those involved in competitive sport	**.724**	.240
6. Current drug tests are effective to correctly identify prohibited substances, if taken	**.653**	**.364**
7. Anti-doping processes and procedures treat all athletes equally and fairly	**.637**	.233
8. Punishments are proportionate to the gravity of the doping offence	**.623**	.166
9. The Anti-Doping Code plays a critical role in protecting the 'spirit of sport'	.206	**.855**
10. Values of the 'spirit of sport' are evident in the Anti-Doping Code	.253	**.852**

Item to total correlations (Table 10) did not identify any problematic item, all correlating individually with the total score strongly (r > 0.5). Until this is empirically tested, the 10-item version is recommended for use as a unidimensional measure.

Table 10: Item total correlation and change in Cronbach alpha if item deleted

ITEM	15-item version				10-item version			
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Corr.	Alpha if Item Deleted	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Corr.	Alpha if Item Deleted
Anti-doping strategies promote clean sport culture at all ages and levels	60.60	138.992	.639	.911	-	-	-	-
Values of the 'spirit of sport' are evident in the Anti-Doping Code	60.78	140.634	.583	.913	38.87	65.309	.541	.877
The Anti-Doping Code plays a critical role in protecting the 'spirit of sport'	60.51	140.541	.571	.913	38.60	65.896	.494	.880
The Anti-Doping Code protects athletes' health effectively	60.81	140.156	.681	.910	-	-	-	-
The Anti-Doping Code sufficiently assures that sport results and records are achieved without drugs	60.96	137.114	.682	.910	39.05	61.988	.695	.866
Anti-doping processes and procedures treat all athletes equally and fairly	60.98	138.211	.598	.913	39.07	63.140	.584	.874
Punishments are proportionate to the gravity of the doping offence	61.14	139.201	.526	.915	39.23	63.197	.539	.878
Resources to protect clean sport are allocated appropriately	61.39	138.894	.641	.911	-	-	-	-
The Anti-Doping Code ensures global compliance effectively	61.30	136.310	.672	.910	39.39	61.683	.670	.868
The burden of doping control is shared fairly among those involved in competitive sport	61.25	136.611	.659	.910	39.33	61.724	.665	.868
Drug testing in sport meets the most rigorous industry standards	61.20	138.046	.677	.910				
Current drug tests are effective to correctly identify prohibited substances, if taken	61.03	137.836	.656	.911	39.11	62.525	.665	.868
Anti-doping education equips athletes with skills necessary to avoid doping	60.99	140.779	.591	.913				
Values-based education prevents doping	61.01	141.721	.540	.914				
The Anti-Doping Code gives equal emphasis to values-based prevention and testing-based doping control	60.84	142.291	.679	.911	38.92	66.013	.666	.871

Internal consistency reliability

Both the 15-item and 10-item variant showed good internal consistencies (Cronbach alpha = 0.917 and 0.883, respectively). Subscales' internal consistency reliability coefficients of the 15-item version were as follows: Normative legitimacy (α = 0.817), Procedural legitimacy: fair process (α= 0.793) and Procedural legitimacy: fair outcome (α = 0.783).

Construct validity

Convergent and divergent validity was evidenced by correlations between measures of the same constructs. The key difference between the direct measures (3 items separately or collectively) and the ADoLP scale and its subscales is the way assessment is made about anti-doping legitimacy. The direct questions require respondents to *make the assessment of anti-doping* for being proper (needed and justified), just (fair process) and appropriate (fair outcome). ADoLP aske participants to make a judgement on the components of anti-doping, and make inferences for anti-doping being proper, just and appropriate based on the combination of the judgements made at the item (not construct) level.

Correlation coefficients shown in Table 11 shows that the 15-item ADoLP and well as the shorter 10-item ADoLP correlates positively and strongly with the direct measure of anti-doping legitimacy (r = 0.630 and r = 0.594, p < 0.001 respectively). The close to perfect linear correlation coefficient (r = .964) between the two ADoLP versions suggest little if any meaningful difference between the two as an all-encompassing measure of perceived normative and procedural anti-doping legitimacy.

The advantage of the longer, 15-item measure lies in the option to assess normative and procedural legitimacy separately. Two measures of normative legitimacy also showed positive significant correlation (r = 0.517). Procedural legitimacy components (fair process and fair outcomes, including being effective in protecting sport) showed similar correlation between ADoLP subscales and direct measures (r = 0.584 and r = 0.576, p < 0.001).

The notable cross-component correlations (> 0.5) indicate that athletes may not differentiate between legitimacy components when they think about the justness and fairness of anti-doping. This would certainly be in line with our initial difficulties in recreating a clear factor structure among the initial item set. Further research is required to delineate how unique each subscale measure is independently, or whether it is better to use the shorter scale for an overall assessment of anti-doping legitimacy perception.

In order to examine the ability to predict doping behaviour from perceptions of legitimacy it is necessary to establish predictive validity. This form of validity is assessed by demonstrating that the scores from one survey makes accurate predictions about the construct which you are trying to predict. To establish predictive validity of the ADoLP, correlation analysis was conducted between the ADoLP and both normative obedience and intention to dope (likelihood of committing anti-doping rule violation).

The current sample size is not sufficiently large for a robust path analysis for the hypothesized behavioural model is Figure 6. Instead, we conducted correlation analyses between the constructs (Table 12). We found that all constructs correlate significantly with the legitimacy perception measure, and in most instances, with each other except anti-doping knowledge which only correlated with expected obedience (r = 0.367, p < 0.01). The strongest correlation was between anti-doping legitimacy perception and perceived trustworthiness of anti-doping organisation (r = 0.684, p < 0.01).

Table 11: Correlations between anti-doping legitimacy perception measures (N = 105; * p < 0.05, ** p < 0.01)

	1	2	3	4	5	6	7	8	9
1. ADoLP Normative legitimacy subscale	1.000								
2. ADoLP Procedural legitimacy: Process subscale	.572**	1.000							
3. ADoLP Procedural legitimacy: Outcome subscale	.659**	.681**	1.000						
4. ADoLP (15 items)	.848**	.852**	.878**	1.000					
5. ADoLP (10 items)	.805**	.870**	.811**	.964**	1.000				
6. Direct normative anti-doping legitimacy (proper)	.517**	.432**	.414**	.486**	.466**	1.000			
7. Direct procedural anti-doping legitimacy (appropriate/fair outcome)	.477**	.554**	.576**	.582**	.556**	.582**	1.000		
8. Direct procedural anti-doping legitimacy (just/fair process)	.459**	.584**	.592**	.613**	.583**	.575**	.662**	1.000	
9. Direct anti-doping legitimacy assessment (3 items)	.534**	.578**	.596**	.630**	.594**	.809**	.840**	.883**	1.000

Table 12: Correlations between anti-doping legitimacy perception measures and cognate constructs (N = 105; * p < 0.05, ** p < 0.01)

	1	2	3	4	5	6	7	8
1. ADoLP (15 items)	1.000							
2. Direct anti-doping legitimacy assessment (3 items)	.630**	1.000						
3. Normative (expected) obedience with anti-doping rules	.286**	0.191	1.000					
4. Perceived trustworthiness of anti-doping organisations	.684**	.638**	.235*	1.000				
5. Attitude toward compliance with anti-doping rules	.245*	.197*	.342**	.224*	1.000			
6. Compliance self-efficacy (confidence)	.253**	.154	.246*	.259**	.305**	1.000		
7. Anti-doping experience ('happiness')	.360**	.407**	0.097	.274**	.384**	.068	1.000	
8. Anti-doping knowledge	-.021	.019	.367**	-.107	-.063	.080	.039	1.000

We also tested for differences between known groups based on self-reported data on doping use with three groups (Figure 9) and education with two groups (Figure 10).

It is notable that anti-doping knowledge increased with involvement in performance-enhancement via not-prohibited means (e.g., nutritional supplements) and use of prohibited substances.

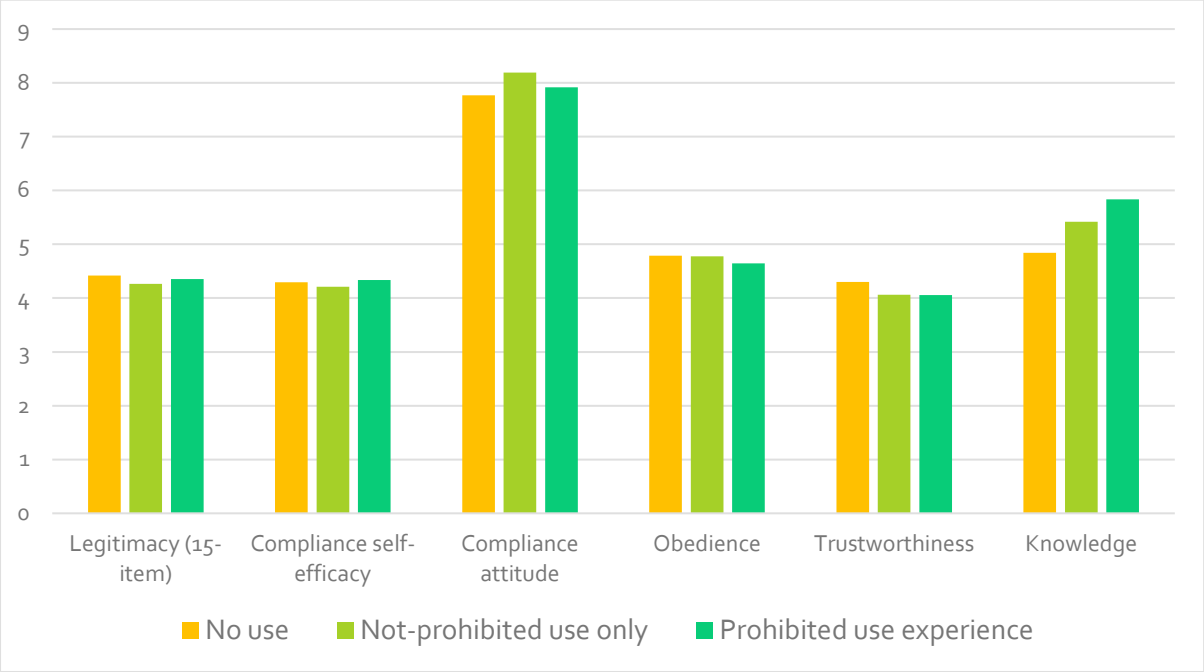

Figure 9: Impact of self-reported doping on perceptions and knowledge of anti-doping

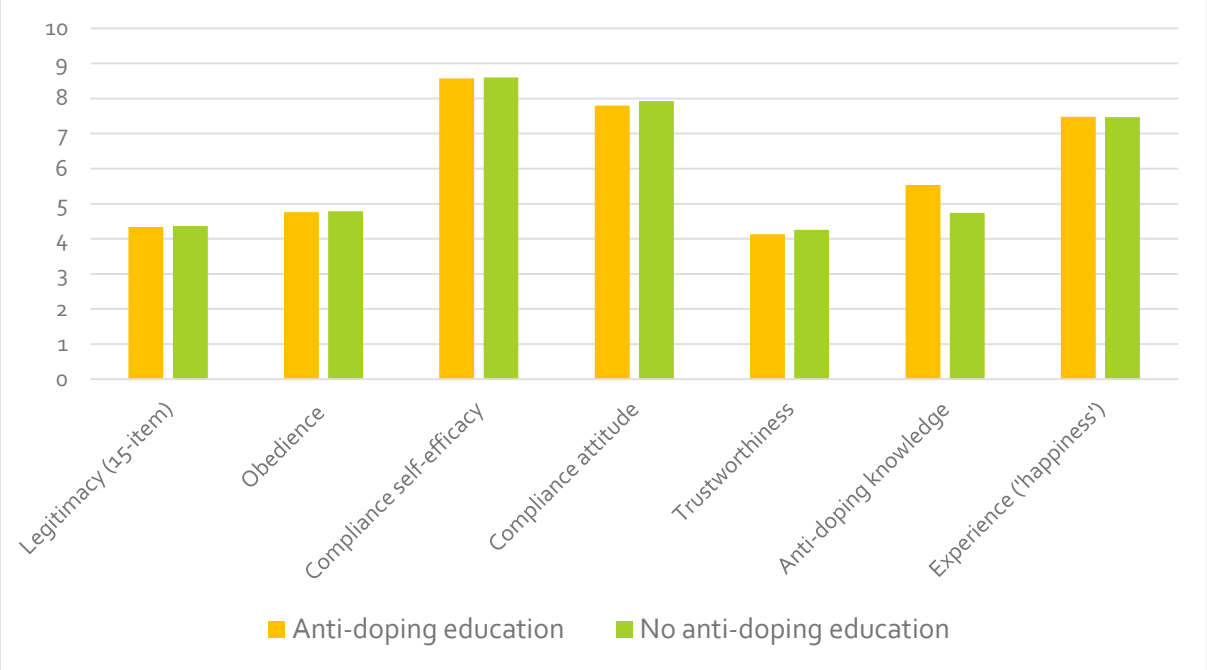

Figure 10: Impact of anti-doping education on perceptions and knowledge of anti-doping

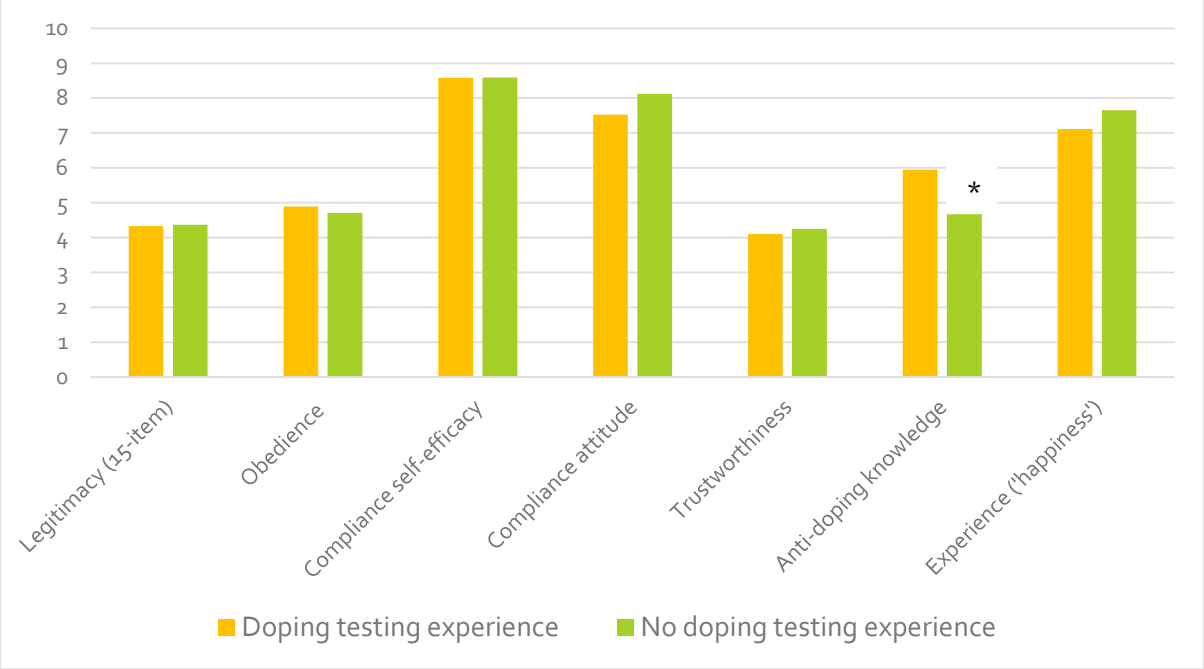

Figure 11: Impact of experience with doping testing on perceptions and knowledge of anti-doping. Statistically significant difference is marked with *

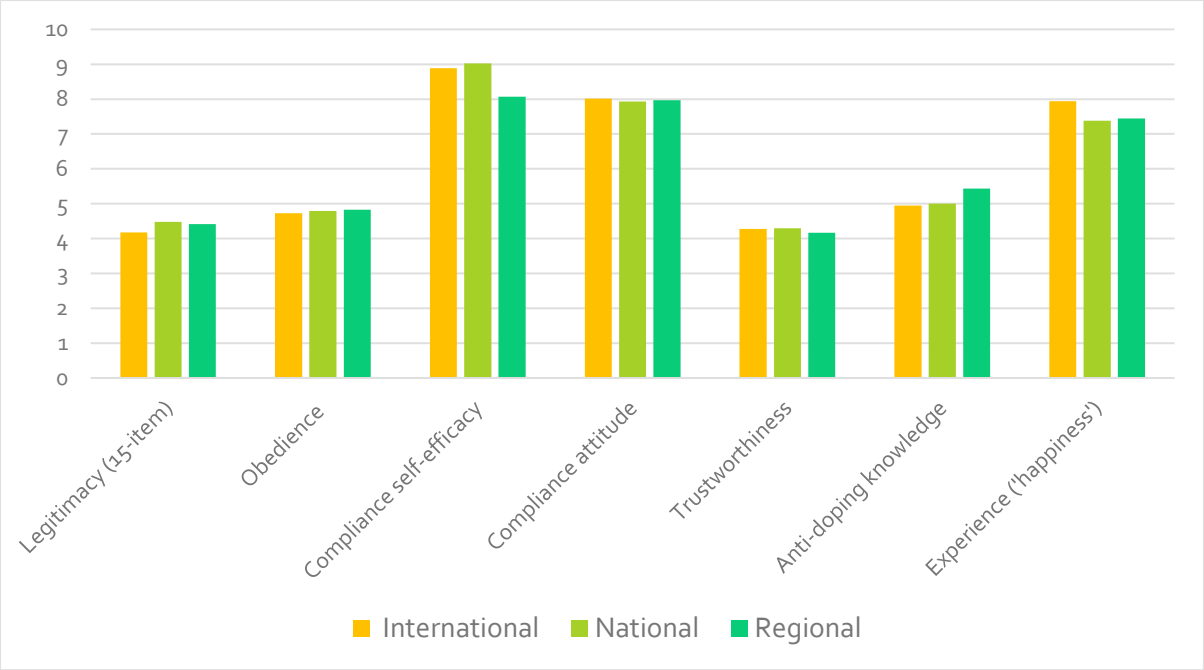

Figure 12: Impact of sport competition level on perceptions and knowledge of anti-doping.

The sample mean differences were in the expected direction, but none reached statistical significance except anti-doping knowledge by testing experience. This is most likely because of the relatively large SD and small sample size. If this is the case, a large sample might be required to test the behavioural model as a whole. The alternative plausible reason is the composition of the sample. Differences might be more pronounced in a sample of athletes at the top elite level. The observed

difference by testing experience is likely a function of sport competitive level (and thus the likelihood of testing) than the testing procedure per se.

We also created groups based on multiple characteristics (sport competition level, anti-doping education, substance use and testing experience) using two-step clustering method. The cluster quality was 'fair' (silhouette measure of cohesion and separation = 0.4/1). Characteristics of the two groups are shown in Figure 13.

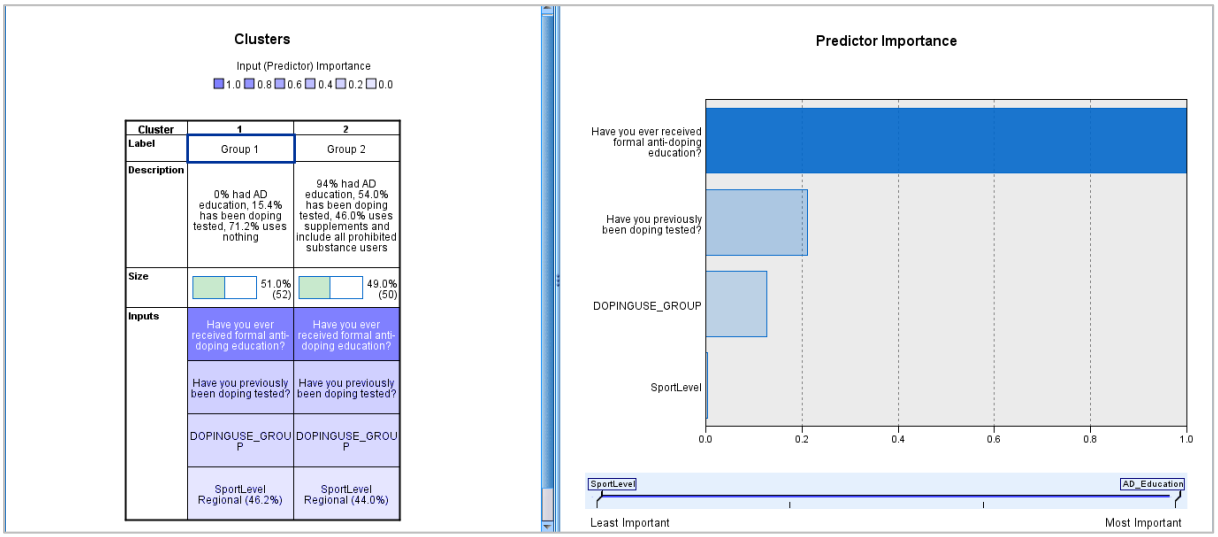

Figure 13: Clustered groups of respondents

We then tested for group differences. The only difference close to statistical difference found for anti-doping knowledge (t = 1.956 , p = 0.053) where group 1 (with anti-doping education) scored higher (mean = 4.80, SD = 2.31) compared to those without education (mean = 5.6, SD = 1.83).

Discussion and conclusion

Via two empirical studies with 858 competitive-level athletes from five European countries (Germany, Greece, Italy, Russia and the UK), we offered three versions with 19, 15 and 10 items for assessing perceived anti-doping legitimacy. The results offer reassurance that the *Anti-Doping Legitimacy Perception (ADoLP)* scale is a promising tool for assessing athletes' perception of anti-doping legitimacy. Further research is required to test the scale's internal structure (dimensionality) and predictive validity. The latter should involve developing a better understanding of how perceived anti-doping legitimacy impact behaviour. Our data generated so far (including the systematic mapping review) suggest that – in contrast to the common view about the link between legitimacy and voluntary compliance - perceived anti-doping legitimacy does not impact voluntary compliance with the anti-doping rules by athletes. Rather, it influences how athletes *feel about compliance* with anti-doping rules and regulations; and whether they actively support anti-doping.

In the two empirical studies, we also developed and tested measures of cognate constructs: namely (1) *expected (normative) obedience* (in studies 1 & 2) and (2) *anti-doping rule-compliance efficacy* (in study 2); and gathered further empirical data for the previously used (3) three/four-item *direct measure of anti-doping legitimacy* (study 1) and (4) short form of the *Performance-Enhancement Attitude Scale (PEAS-*

8) to measure general doping attitude (study 1). Items are presented in Appendix E to assist future applications of these measures.

Furthermore, perception of anti-doping legitimacy is important among all stakeholders. So far, we focused on athletes. Future works should involve applying the scale to other stakeholders (e.g., athlete support personnel, officers of anti-doping organisations and sport federations, anti-doping researchers and potentially the general public, sponsors, agents and journalists). Using the longer (19 or 15-item) version is recommended with population other than athletes because the omitted items from the 10-item version could be more meaningful to them based on their unique perspective and/or in-depth knowledge of anti-doping.

Given the global nature of anti-doping, it is reasonable to expect that cultural context does not impact the scale significantly, however anti-doping knowledge of the respondent is. Future research should implement ADoLP together with assessment of anti-doping knowledge, and examine the scale further in the context of personal as well as vicarious experiences, and sources of anti-doping information.

Further work is required to ensure that the 10-item knowledge quiz measure applied anti-doping knowledge accurately. With the items we focused on aspects where anti-doping knowledge is applied to practice and lead to a specific decision within the power of the respondents as opposed to 'theoretical knowledge' if what substance is banned for example. There is no doubt that the knowledge measure can be improved with adding items to cover more details. Evaluation of anti-doping education would benefit from a valid and accurate 'practical knowledge test' that is general enough to be applicable to all sports.

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Appendix A: Study details included in the mapping review, presented in chronological order

Study	Participants	Design	Country	Methods	Measure of legitimacy perception	Source of legitimacy[a]	Inter-rater agreement	Key findings &	Legitimacy components
Striegel, Vollkommer & Dickhuth, 2002 Journal article	101 athletes subject to national and international anti-doping tests	Quantitative	Germany	Paper and pencil survey	Measures regarding athletes' views of anti-doping and sanctions	PRP APR	100% 100%	Athletes believed anti-doping measures were needed and favoured improved methods of detection	'justified procedures' 'effectiveness of anti-doping procedures'
Sas-Nowosielski & Świątkowska, 2007 Journal article	830 national level athletes from team and individual sport (68.3% males)	Quantitative	Poland	Paper and pencil survey	45 items about knowledge on athletes' rights and responsibilities, doping control procedures, prohibited substances and methods and their side effects. 20 items measuring attitudes towards the	PRP	100%	Athletes displayed limited knowledge of the doping control procedures, although they held positive attitudes towards the doping control system	'justified procedures'

					doping control system				
Hanstad & Loland, 2009 Journal article	236 athletes in the Anti-Doping Norway RTP	Quantitative	Norway	Web-based survey	Items measuring opinions about the whereabouts system	PRP JST APR	75% 100% 100%	Athletes questioned the justification and fairness of the whereabouts system	'justified procedures' 'harmonisation' 'fairness in sanctions' 'suitability of anti-doping procedures for addressing the problem' 'effectiveness of anti-doping procedures'
Hanstad, Skille & Thurnston, 2009 Journal article	236 top level athletes (64.3% males)	Quantitative	Norway	Web-based survey	Items measuring opinions about the anti-doping system	PRP JST	75% 100%	Athletes agreed that doping is a threat to sports. They raised concerns on the fairness of the whereabout system	'justified procedures' 'treating athletes equally and fairly'
Bloodworth & McNamee, 2010 Journal article	40 talented athletes from team and individual sports (55% males)	Qualitative	United Kingdom	Focus Groups	Open discussions relating to perceptions of doping and anti-doping	PRP JST	75% 75%	Athletes gave extensive reference to what they believed to be a greater doping problem in other countries than their own	'justified procedures' 'harmonisation'

Dunn, Thomas, Swift, Burns & Mattick, 2010 Journal article	974 elite athletes (75.6% males)	Quantitative	Australia	Paper and pencil survey	Items measuring level of endorsement for current penalties	JST APR	100% 100%	The majority of athletes agreed that the current sanctions for being detected were appropriate	'fairness in sanctions' 'effectiveness of anti-doping procedures' 'threat of sanctions as prevention'
Judge, Bellar, Craig & Gilreath, 2010 Journal article	240 track and field athletes (59% males)	Quantitative	United States of America	Web-based survey	Items measuring drug testing attitudes	JST APR	100% 75%	The majority of athletes did not believe that protocols were fair, and that drug testing was not catching all athletes who dope	'treating athletes equally and fairly'
Orr, Grassmayr, Macniven, Grunseit & Bauman, 2010 Conference Abstract	262 athletes from individual and team sports (53% male)	Quantitative	Australia	Survey	Items measuring athletes' knowledge, attitudes, intentions and behavior of anti-doping policy, drug testing and anti-doping education	PRP APR	75% 100%	Majority considered drug testing as important and that they were not informed of the drug testing procedure	'justified procedures' 'suitability of anti-doping procedures for addressing the problem' 'education'
de Hon, Eijs & Havenga, 2011	432 elite athletes and professional footballers	Quantitative	Netherlands	Web-based survey	Items measuring athlete attitudes	PRP JST	75% 75%	Less than 20% consider whereabouts necessary in their sport	'justified procedures'

Conference Abstract					toward anti-doping testing	APR	75%	although more than 50% support the principle of OOC testing	'harmonisation' 'education'
Gucciardi, Jalleh, & Donovan, 2011 Journal article	670 Olympic, international, national and state level (42% males	Quantitative	Australia	Mail survey	3 items measuring how secure, serious and effective the anti-doping procedures are in Australia	APR	100%	No effect of perceptions of legitimacy on doping attitudes. Legitimacy was correlated with morality, benefit appraisal and reference group opinion	'effectiveness of anti-doping procedures'
Kirby, Moran & Guerin, 2011 Journal article	5 male athletes who had doped for performance enhancement	Qualitative	Ireland, Scandinavia and USA	Semi-structured interviews	Questions relating to the deterrents and potential changes of the anti-doping system	APR	100%	Being caught was only a minor concern and there were many contradictory suggestions to improve anti-doping policies	'threat of sanctions as prevention'
CCES, 2013 NADO research	90 registered testing pool athletes	Quantitative	Canada	Survey	3 items measuring perceptions of the effectiveness of anti-doping	APR	75%	Athletes reported that the CCES did a good job and protected the integrity of clean sport. However, they reported that the CCES was	'effectiveness of anti-doping procedures'

								always one step behind dopers	
Jalleh, Donovan, & Jobling, 2013 Journal article	1237 Olympic, international, national and state level (48.74% males)	Quantitative	Australia	Mail survey	5 items measuring testing security and fair testing and appeal procedures	JST APR	75% 100%	Legitimacy significantly predicted PES attitudes	'fairness in sanctions' 'robustness of the anti-doping system'
Overbye & Wagner, 2013 Journal article	645 international level and nationally elite athletes (59% males)	Quantitative	Denmark	Web-based survey	5 items on athlete perceptions of the Therapeutic Use Exemption system	JST APR	75% 75%	Half of the athletes believed that some TUEs were obtained without a need. Those who received a TUE tended to distrust the TUE system more than those who had not	'Therapeutic Use Exemption' 'effectiveness of anti-doping procedures'
Bourdon, Schoch, Broers & Kayser, 2014 Journal article	69 elite athletes	Quantitative	France, Belgium, Switzerland	Web-based survey	28 measuring opinions, attitudes, trust and experiences with the anti-doping system	PRP JST APR	75% 100% 100%	Athletes perceived the anti-doping system (i.e., ADAMS, TUE, Whereabouts) as necessary. However, they raised concerns and displayed low trust to the anti-doping system	'justified procedures' 'harmonisation' 'suitability of anti-doping procedures for addressing the problem'

									'effectiveness of anti-doping procedures'
Elbe & Overbye, 2014 Journal article	400 elite athletes of team and individual sports (60.8% males)	Quantitative	Denmark	Web-based survey	7 items on participants experiences with doping control	JST APR	75% 100%	Athletes approve doping controls but sometimes experience negative emotions and feel a threat to their personal integrity	'treating athletes equally and fairly' 'suitability of anti-doping procedures for addressing the problem'
Nolte, Steyn, Fletcher & Kruger, 2014 Journal article	346 high-school athletes (60% male)	Quantitative	South Africa	Survey	Items relating to morality and education of doping	PRP APR	75% 100%	Using PEDs is morally wrong and not enough education is being done in South Africa	'justified procedures' 'education'
Overbye & Wagner, 2014 Journal article	645 international level and nationally elite athletes (59% males)	Quantitative	Denmark	Web-based survey	4 items on the fairness and effectiveness of the whereabout system	PRP JST APR	100% 100% 100%	The whereabout system is considered necessary. Low trust on the global functioning of the whereabout system	'justified procedures' 'harmonisation' 'effectiveness of anti-doping procedures'
Valkenburg, de Hon & van Hilvoorde, 2014 Journal article	129 elite athletes (41% males)	Quantitative	Netherlands	Paper and pencil survey	Items measuring athletes opinions about the whereabout system	PRP JST APR	75% 75% 100%	Athletes supported the anti-doping system. However, they raised concerns about the	'justified procedures' 'treating athletes equally and fairly'

								whereabouts system, such as intruding athletes' privacy	'suitability of anti-doping procedures for addressing the problem'
Duiven, de Hon & Netherlands ADA, 2015 NADO research	740 elite status athletes	Quantitative	Netherlands	Web-based survey	Randomised response method to questions about doping controls	PRP JST APR	75% 75% 75%	The majority of athletes never have doubts about the integrity of a doping control. Comments suggest concerns of anti-doping integrity outside of the Netherlands	'justified procedures' 'harmonisation' 'robustness of the anti-doping system'
Engelberg, Moston & Skinner, 2015a Journal article	18 athletes who had committed anti-doping violations (83% males)	Qualitative	Australia	Semi-structured interviews (9 face to face; 9 online written)	Topics included factors influencing the decision to dope and perceptions of the sanction process	PRP JST APR	100% 75% 100%	Bodybuilders saw the sanction process as hypocritical and unfair, and that anti-doping organisations should leave sports to self-govern. Other athletes believed the system, although fallible, was fair and supported stricter sanctions.	'justified procedures' 'treating athletes equally and fairly' 'fairness in sanctions' 'threat of sanctions as prevention'

Moston, Engelberg, & Skinner, 2015a Journal article	488 elite athletes competing at state level or above from team and individual sports (79.3% males)	Quantitative	Australia	Web-based and paper and pencil surveys	Items measuring athletes' perceptions of certainty of detection and anti-doping policy	APR	75%	Athletes reported mixed views on the certainty of detection, with the majority viewed the current anti-doping regime as effective	'fairness in sanctions' 'effectiveness of anti-doping procedures'
Overbye, Elbe, Knudsen & Pfister, 2014 Journal article	645 international and national level athletes from team and individual sports (59% male)	Quantitative	Denmark	Web-based survey	4 items measuring the deterrent effects of legal, social, financial and self-imposed sanctions	APR	100%	The ban and social sanctions emerged as the most important deterrent of doping	'threat of sanctions as prevention'
Donovan, Jalleh & Gucciardi, 2015 Journal article	1,237 Olympic, international, national and state level (48.74% males)	Quantitative	Australia	Mail Survey	4 items on the equality, security and accuracy of anti-doping testing	JST APR	100% 100%	Athletes perceive the NADO to be fair and secure, however are unsure as to the accuracy of anti-doping testing	'treating athletes equally and fairly' 'effectiveness of anti-doping procedures' 'robustness of the anti-doping system'
Efverstrom, Ahmadi, Hoff, & Backstrom, 2016a Journal article	261 elite athletes involved in athletics, basketball, ski and volleyball (54% male)	Quantitative	International sample	Online survey	6 items on the shared values, appropriateness and effectiveness of the doping control and whereabout procedures	PRP JST APR	75% 100% 75%	Athletes a) accept the legitimacy of the rules, b) raised concerns about the legitimacy of the way the rules are enforced, c) privacy, lack of	'justified procedures' 'harmonisation' 'selection process'

								efficiency and equal conditions were identified as threats of legitimacy	
Efverstrom, Backstrom, Ahmadi, & Hoff, 2016b Journal article	13 elite athletes from athletics, basketball, ski and volleyball (54% male)	Qualitative	International sample	Semi-structured interview	Interview guide on perceptions of equity, experiences of different anti-doping elements, and the athletes influence in anti-doping settings.	JST APR	100% 100%	Implementation of anti-doping procedures in different contexts causes inequalities and injustice. This negatively influences legitimacy	'harmonisation' 'education'
Overbye, 2016 Journal article	645 international level and nationally elite athletes (59% males)	Quantitative	Denmark	Web-based survey	6 items on the appropriateness of the doping control procedures	JST APR	75% 100%	National doping control procedures were found appropriate, but not those in other countries. Athletes asking for an effective system were less satisfied with the existing anti-doping procedures	'harmonisation' 'selection process' 'robustness of the anti-doping system'
Erickson, Backhouse & Carless, 2017	28 student athletes (46% male)	Qualitative	UK & USA	Semi-structured interviews	Interviews structured around attitudes	PRP	75%	Athletes believe that using PEDs is not what 'sport is about'	'justified procedures'

Journal article					towards whistleblowing				
Gebert, Lamprecht & Stamm, 2017 NADO research	588 athletes who had been subject to Anti-doping Switzerland controls in the previous 36 months (65% male)	Quantitative	Switzerland	Web-based survey	5 items measuring perceptions of security and equality of anti-doping procedures	JST APR	100% 100%	Athletes reported that doping was less likely to be caught in other countries than their own. The majority of athletes report the doping controls to be secure	'harmonisation' 'robustness of the anti-doping system'
Overbye, 2017 Journal article	645 international and national level athletes from team and individual sports (59% male)	Quantitative	Denmark	Web-based survey	2 items measuring the deterrent effect of the doping control system	JST APR	75% 100%	Athletes did not perceive doping controls as deterrent to doping use	'effectiveness of anti-doping procedures'
USADA, 2017 NADO research	886 current and former registered testing pool athletes (56.3% males)	Quantitative	USA	Survey	6 items on athlete perceptions of the US anti-doping system	PRP JST APR	100% 100% 75%	National doping control procedures were found proper and appropriate. Athletes believed there to be differences in testing within foreign NADOs	'justified procedures' 'harmonisation' 'fairness in sanctions' 'robustness of the anti-doping system'

Henning & Dimeo, 2018 WADA report	24 national and international level athletes in athletics, badminton, cycling, fencing, field hockey, swimming	Qualitative	Australia, Brazil, Denmark, India, South Africa, U.S., U.K.	Interviews via Skype	Semi-structured interviews covering NADOs and processes and regulations.	PRP JST APR	100% 100% 100%	Athletes were in favour and supportive of anti-doping. They were sceptical of the ability to harmonize international efforts and to effectively deter athletes from doping.	'justified procedures' 'harmonisation' 'effectiveness of anti-doping procedures'
Kegelaers, Wyllemna, De Brandt, Van Rossem & Rosier, 2018 Journal article	36 current and former elite athletes (53% males)	Qualitative	Belgium	Multiple qualitative methods (i.e. face-to-face &. focus group interviews, biographical analysis)	Interview questions focusing on the incentives and deterrents of doping utilising the 'push pull anti-push anti-pull' framework	APR	100%	Athletes described low chances of being caught as push factors, anti-doping policies and personal values as anti-push factors and sanctions as anti-pull factors	'effectiveness of anti-doping procedures' 'threat of sanctions as prevention'
Scharf, Zurawski & Ruthenberg, 2018 Journal article	523 athletes from individual and team sports (48.4%)	Quantitative	Germany	Web-based survey	Items relating to the intrusion of the ADAMS (Whereabouts) system into private life and protecting sport	PRP JST APR	75% 75% 75%	The majority of athletes believe that out of competition whereabouts protected sport, but are not favourable of the intrusive nature whereabouts system	'justified procedures' 'treating athletes equally and fairly' 'suitability of anti-doping procedures for addressing the problem'

Westmattelmann, Dreiskämper, Strauß, Schewe & Plass, 2018 Journal article	146 top cycling and athletics athletes (48% males)	Quantitative	Germany	Web-based survey	14 items measuring the effectiveness of anti-doping procedures	JST APR	100% 100%	Athletes reported that anti-doping procedures were moderately effective	'treating athletes equally and fairly' 'threat of sanctions as prevention' 'education'
Al Ghobain, 2019 Journal article	408 male elite Saudi football players	Quantitative	Saudi Arabia	Questionnaire	Social Science Research Package. 4 items measuring legitimacy perceptions	JST APR	100% 100%	Majority of athletes believed the NADO to treat athletes equally, procedures were secure, offered a fair-hearing session for positive tests and TUEs were not thoroughly evaluated	'treating athletes equally and fairly' 'fairness in sanctions' 'robustness of thec anti-doping system'
Massucci, Butryn, & Johnson, 2019 Journal article	12 female professional world-class triathletes	Qualitative	USA and Canada	Semi-structured interview	Interview guide on perceptions and experiences of anti-doping efforts in triathlon	APR	100%	Anti-doping procedures have been improved but are not considered effective	'effectiveness of anti-doping procedures' 'robustness of the anti-doping system'

Qvarfordt, Ahmadi, Bäckström, & Hoff, 2019 Journal article	13 elite athletes registered in the testing pool in athletics, basketball, skiing and volleyball (54% male)	Qualitative	International sample	Semi-strucured interview	Interview guide on perceptions of anti-doping policy and procedures	JST APR	75% 100%	Athletes perceive limited information and a lack of leeway, yet an obligation to be dutiful to the anti-doping system. This complex situation puts the system at risk.	'treating athletes equally and fairly' 'suitability of anti-doping procedures for addressing the problem' 'education'
Global Athlete, 2020 Independent research report	491 athletes who were/had competed at Olympic, Paralympic. International and National level	Quantitative	International sample from 48 countries	Web-based survey	Items relating to own NADO, other NADOs and WADA	JST APR	100% 100%	The majority of athletes feel that WADA does not work transparently, requires further reform and have less trust in international anti-doping programs than national ones	'harmonisation' 'effectiveness of anti-doping procedures'

Notes:

[a] *Proper: normative; shared values [PRP], Just: process focused; rules are applied fairly and equally [JST], Appropriate: outcome focused; suitable and effective [APR]*

Appendix B: Legitimacy Perceptions (WADA Social Science Research Package)

Reference: Donovan, R., Jalleh, G. & Gucciardi, D. (2015). Research package for Anti-Doping Organizations (pp 49-50) https://www.wada-ama.org/sites/default/files/resources/files/wada_social_science_research_package_ado.pdf

Definition: The legitimacy of anti-doping organizations refers to the extent to which they are seen to be duly constituted and have valid authority to enforce anti-doping regulations. It is generally believed that the stronger an organization's perceived (and actual) legitimacy, the more likely people will comply with that organization's rules and regulations (Tyler, 1990). Tyler's (1990) conceptualization of the influence of justice on the legitimacy of legal authorities provides a framework for understanding athletes' perception of the legitimacy of anti-doping organizations in undertaking drug testing.

According to Tyler (1990), an authority's legitimacy is influenced by three dimensions of justice:
(1) distributive justice – the fairness of the outcomes of a system;
(2) procedural justice – the fairness of the processes; and
(3) interactional justice – the fairness of the interpersonal treatment during implementation of the procedures (Bies & Moag, 1986; Gilliland, 1993).

Hence, the legitimacy of anti-doping organizations is based on establishing a fair and just drug testing regime (distributive justice), with clear and transparent processes in collecting, analyzing and storing of samples for testing, fair processes for any subsequent appeals of an anti-doping rule violation in tribunals and the Court of Arbitration for Sport (procedural justice), and courteous treatment of athletes by personnel administering the drug collection procedure (interactional justice). Donovan et al. (2002) theorized that if athletes perceive an anti-doping organization's drug testing regime to be fair and just on these dimensions of justice, then the legitimacy of the anti-doping organization in conducting drug testing is likely to be enhanced, and compliance with anti-doping regulations more likely.

Perceptions of legitimacy of the enforcement agency's testing and appeals processes measured on Tyler's (1990) three dimensions of justice.

(i) Distributive justice
Definition: The perceived fairness of the outcomes of the drug testing process.
Items:
- Equitable treatment of all athletes by the enforcement agency,
- Security of the testing procedures, and
- Accuracy of the current drug tests.

Q#. How fair is the (insert name of NADO) in terms of treating all athletes equally? (Very fair/Fair/Unfair/Very unfair/I don't know)

Q#. How secure is the (insert name of NADO)'s drug testing procedures in (country)? That is, in the taking of samples and the care of samples? (Very secure/Quite secure/Not really secure/Not at all secure/Don't know)

Q#A. How accurate do you feel the current drug tests are in terms of being able to correctly identify the following substances? (Very accurate/Quite accurate/A little accurate/Not at all accurate/Don't know)

1. Anabolic steroids
2. Beta-blockers
3. Designer steroids like tetrahydrogestrinone (THG
4. Erythropoietin (EPO) and other similar substances
5. Human growth hormones (hGH)
6. Diuretics

Q#B: How accurate do you feel the current drug tests are in terms of being able to correctly identify banned performance enhancing substances?

(ii) Procedural justice

Definition: The perceived fairness of the appeals process.

Items:

• Level of satisfaction in receiving a fair hearing in appealing a positive test.

• Level of satisfaction in receiving a fair hearing prior to decision on imposing sanctions.

• Level of satisfaction in receiving a fair hearing in the Court of Arbitration in Sport.

Q#. How satisfied are you that athletes who appeal a positive test in (insert name of country) will be given a fair hearing? (Very satisfied/Somewhat satisfied/Somewhat dissatisfied/Very dissatisfied/Don't know)

Q#. How satisfied are you that athletes in your sport who test positive will be given a fair hearing before a decision is made about applying a penalty? (Very satisfied/Somewhat satisfied/Somewhat dissatisfied/Very dissatisfied/Don't know)

Q#. How satisfied are you that athletes who appeal a positive test before the Court of Arbitration in Sport will be given a fair hearing? (Very satisfied/Somewhat satisfied/Somewhat dissatisfied/Very dissatisfied/Don't know)

(iii) Interactional justice

Definition: The interpersonal interactions with personnel administering the drug collection procedure.

Item:

• Among athletes who have been drug tested:

Q#. Did you find the experience of being tested traumatic or upsetting in any way? (No/Yes – somewhat/Yes – very much)

Q#. How would you describe the conduct of the testing personnel?

(a) Courteous OR Rude Or Neither

(b) Helpful OR Unhelpful Or Neither

(c) Friendly OR Unfriendly Or Neither

(d) Sensitive OR Insensitive Or Neither

Appendix C: Anti-doping legitimacy – Pilot study

A pilot study was conducted with sport and exercise science students in England using a preliminary set of legitimacy items. The primary aim of this pilot study was to establish whether people involved in sport have views on anti-doping legitimacy and are able to report these views via agreement to legitimacy statements on a Likert-type scale.

Forty-eight sport and exercise science students (64.4% male) in England participated in the pilot study. The mean age was 22.8 years (SD = 4.4, range 19 – 39 years). On average, they estimated that 38.8% (SD = 22.1) or the top-level athletes and 33.1% (SD = 23.0) of amateur and recreational athletes use prohibited performance enhancing substances. Five were subject to doping control (only one had ever been tested) and a further ten had a friend who had been tested. The remaining 33 participants had no personal experience with doping control. Their self-rated knowledge of anti-doping rules was average (47% out of a maximum 100%, SD = 21%).

The initial item set comprised 13 items informed by the available literature on anti-doping legitimacy (Overbye, 2013; Overby & Wagner, 2014; 2016; Efverström et al, 2016a, 2016b,) and WADA Social Science Research Package for Anti-Doping Organisations (Donovan, Jalleh & Gucciardi, 2015).

Internal consistency reliability of the 13 items was good (Cronbach alpha = .860). Exploratory factors analysis with varimax rotation (KMO sampling adequacy = .650, Bartlett's test of sphericity < .001) suggested the presence of three factors explaining 62.6% of the variance. These preliminary factors, along with item-by-item reliability analysis, are marked in bold identified in Table 5.

The results indicated that all items correlated with the 'legitimacy' concept with only two items falling below 0.3. Exploratory factor analysis suggested the presence of Tyler's legitimacy perception components (2006) with the third 'factor' (shared norms and motives) including only one item. None of the 13 items correlated with anti-doping knowledge (Kendall tau < 0.1 for all items), which offered reassurance that the anti-doping legitimacy perception items indeed measure a construct independent of anti-doping knowledge.

Factor loadings, item-to-total correlations and internal consistency reliability coefficients (Cronbach alpha) are presented in Table A1.

Table A1: Factor loadings, reliability and item to total correlation assessment of the initial item set

Item	Legitimacy components (factor loadings > 0.3)			Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
	Fair process	Fair outcome	Shared motives					
Anti-doping rules are fully justified.			**.852**	.9545	162.044	.236	.478	.866
Values-based anti-doping incorporates all stakeholders.		**.737**		1.1591	163.997	.232	.604	.865
Anti-doping strategies are clearly communicated to all stakeholders.		**.799**		1.3182	150.362	.498	.578	.851
Anti-doping strategies are coherent and supports each other.	.359	**.630**		1.4545	150.393	.624	.644	.845
Anti-doping processes and procedures treat all athletes equally and fairly.	**.639**	.424		1.7045	139.376	.688	.693	.838
Dealings with doping cases are transparent.	**.646**	.317	-.370	2.3864	147.964	.572	.647	.847
Anti-doping strategies include helping accidental dopers and offenders to prevent future offenses.	**.771**			1.5682	153.135	.498	.593	.851
Punishments are proportionate to the gravity of the doping offence.	**.796**			2.0227	144.534	.594	.679	.845
Resources to protect clean sport are allocated appropriately.	**.658**			1.6818	159.757	.345	.380	.859
Drug testing in sport meets the most rigorous industry standards.	.374	**.633**	-.412	1.6818	147.664	.608	.728	.845
Current anti-doping strategies are effective to protect clean sport.	**.568**	.521		1.8864	141.033	.661	.691	.840
Current drug tests are effective to correctly identify prohibited substances, if taken.		**.664**		1.9318	147.088	.554	.628	.848
Current drug testing protocol is sufficiently robust against manipulation.	**.570**	.451		2.3409	143.579	.639	.595	.842

Appendix D: Measuring anti-doping legitimacy – A validation of the LEGIT survey tool (short version)

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Measuring anti-doping legitimacy – A validation of the LEGIT survey tool (short version)

Introduction

Use of prohibited substances for performance-enhancement in sports remain a major issue on professional and amateur levels (Ulrich et al., 2018).
But to achieve the necessary feeling for obedience and duty towards the system, Tyler (2006) described that this can only be achieved through psychological properties and feelings of legitimacy and justification.
In sports, underlying psychological situations were identified by Petróczi & Aidman (2008), showing dilemma situations of social, situational and systematic pressure to dope.
Ultimately, an interplay of attitude, trustworthiness, legitimacy and morality that results in obedience to the anti-doping system and policies was constructed (Fig. 1) and items attached. In light of current doping prevalence numbers, such a behavior cannot be assumed and the system must be scrutinized.

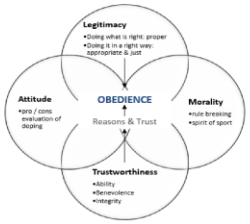

Fig. 1: Fundamental construction factors of obedience to anti-doping policies (Petróczi, Dreiskämper, Brückner & Strauss (2017).

Methods

Aim is to revise and validate the LEGIT tool. The shortened questionnaire consisted of anonymous demographic information, as well as 28 remaining items on 5 subscales: attitude (8), trustworthiness (9), morality (5), legitimacy (3) and obedience (3). Questions are answered on a 6-point Likert scale (I strongly disagree – I strongly agree).
Data collection took place at Kingston University, London and consisted of sports science and sports journalism undergraduate students (N=158, study level 4, 5 and 6, m = 50, f = 81, ms = 27). Data was collected with paper & pencil questionnaires as a lecture entrance. Students were informed verbally about consent and had free choice of participation.

Statistical analyses to determine the tool's operationality base on the calculation of its international consistency (*Cronbach's Alpha*), item-scale and inter-scale correlations, as well as difference tests between subsamples.

Hypotheses

H1: There is a difference between male and female participants.

H2: Participants willing to support anti-doping significantly differ from non-supporters

H3: There is a moderate positive correlation between the 'obedience' and 'legitimacy'.

H4: Inter-subscale correlate theory-confirming positively or negatively in regards of dimensionality.

Results

Tests for internal consistency indicated acceptable to excellent results (α = .77 - .93).

Results of the item–scale-correlation analyses identified satisfying results for all items included in the subscales except one:

	Attitude	*Trust*	*Morality*	*Legitimacy*	*Obedience*
Min	.299*	.595	.581	.542	.840
Max	.737	.754	.750	.661	.889

Difference tests:

Significant gender differences in

- Attitude: U = 1240.5, z = -3.725, p < .001, r = 0.30,
- Trustworthiness: U = 1519.0, z = -2.306, p = .021, r = 0.18
- Morality: U = 1381.0, z = -3.064, p = .002, r = 0.24
- Legitimacy: U = 1537.0, z = -2.326, p = .020, r = 0.19

No significant gender difference on the obedience subscale (U = 1783.5, z = -1.165, p = .224, r = 0.09)

Significant differences between active anti-doping supporters/non-supporters in

- Attitude: U = 1530.0, z = -4.469, p < .001, r = 0.36
- Morality: U = 1518.0, z = -4.518, p < .001, r = 0.36
- Obedience: U = 2119.0, z = -2.314, p = .021, r = 0.18

No significant differences in trustworthiness (U = 2231.5, z = -1.673, p = .094, r = 0.13) and legitimacy (U = 2398.5, z = -1.234, p = .217, r = 0.01).

Correlation tests:

	Attitude	*Trust*	*Morality*	*Legitimacy*	*Obedience*
Attitude	-				
Trust	-.336	-			
Morality	.660	-.158	-		
Legitimacy	-.270	.584	-.159	-	
Obedience	.298	.330	-.170	.329	-

Discussion & Perspectives

Statistical analyses indicated good reliability of the revised LEGIT survey tool. Results of the item-scale-correlations identified eligibility for 34 of 35 items of the questionnaire.
Differences tests showed theory-confirming results. Furthermore, correlation tests between the subscales identified acknowledging outcomes.

Limitations in sample size, missing longitudinal data (e.g. test-retest) validity tests, and no normal distribution may put a limit on a comprehensive evaluation of the questionnaire. In addition, correlation between attitude and morality (r = .660) was examined as moderately positive, and may indicate identical measurement characteristics.
Altogether, the survey's short version exhibits improved operationality compared to the long version, with minor missing validation tests.

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Appendix E: Anti-doping related measures

Anti-Doping Legitimacy Perception (ADoLP) scale

Please read each of the following statements and rate the extent to which you agree:
Normative legitimacy:

1. Anti-doping strategies promote clean sport culture at all ages and levels
2. Values of the 'spirit of sport' are evident in the Anti-Doping Code
3. The Anti-Doping Code plays a critical role in protecting the 'spirit of sport'
4. The Anti-Doping Code protects athletes' health.
5. The Anti-Doping Code assures that sport results and records are achieved without drugs

Procedural legitimacy - processes:

6. Anti-doping processes and procedures treat all athletes equally and fairly
7. Punishments are proportionate to the gravity of the doping offence
8. Resources to protect clean sport are allocated appropriately
9. The Anti-Doping Code ensures global compliance effectively
10. The burden of doping control is shared fairly among those involved in competitive sport

Procedural legitimacy – outcomes:

11. Drug testing in sport meets the most rigorous industry standards
12. Current drug tests are effective to correctly identify prohibited substances, if taken
13. Anti-doping education equips athletes with skills necessary to avoid doping
14. Values-based education prevents doping
15. The Anti-Doping Code gives equal emphasis to values-based prevention and testing-based doping control

Rating scale: strongly disagree (1), disagree (2), slightly disagree (3), slightly agree (4), agree (5) and strongly agree (6).

Direct measure of anti-doping legitimacy

Please rate your agreement with the following statements. There are no right or wrong answers. We are interested in your opinion.

1. Current anti-doping rules are fully justified because they protect clean sport.
2. Current anti-doping rules are effective in protecting clean sport.
3. Current anti-doping rules are fair to all athletes.
4. Current anti-doping rules are implemented equally in all sports and all countries.

In previous use, items 3 and 4 were combined into a single statement, yielding 3 items:

1. The current anti-doping rules are fully justified because it protects clean sport.
2. The current anti-doping rules are effective to protect clean sport.
3. The current anti-doping rules are implemented globally and equally.

Rating scale: strongly disagree (1), disagree (2), slightly disagree (3), slightly agree (4), agree (5) and strongly agree (6).

Normative (expected) obedience with anti-doping

This section contains statements about athletes' obligations. Please indicate your level of agreement with the following statements:

1. It is the athlete's duty to obey, even if he/she personally disagrees with the content of the anti-doping code.
2. It is the athlete's duty to obey, even if he/she personally disagrees with how the anti-doping rules are implemented.
3. It is the athlete's duty to obey, even if he/she personally thinks that the anti-doping procedures are not effective to keep doping out of sport.
4. It is the athlete's duty to obey, even if he/she personally has no trust in the anti-doping organisation that they will deal with all athletes appropriately.
5. It is the athlete's duty to obey, even if he/she personally thinks that organisations involved in anti-doping are not capable of controlling sport.
6. It is the athlete's duty to obey, even if he/she personally thinks that organisations involved in anti-doping have other priorities than the athletes' welfare.
7. It is the athlete's duty to obey, even if he/she personally thinks that organisations involved in anti-doping do not deal fairly with all athletes.

Rating scale: strongly disagree (1), disagree (2), slightly disagree (3), slightly agree (4), agree (5) and strongly agree (6).

Anti-doping rule compliance self-efficacy

Note: This scale comprises two sections: knowledge of the rules and rule-compliance self-efficacy (confidence in complying with the rules).

Please answer the following questions to the best of your knowledge:

1. I am certain that I am compliant with the therapeutic use exemption policy of WADA
2. I am certain that I am compliant with the testing policy of WADA
3. I am certain that I am compliant with the prohibited list policy of WADA
4. I am certain that I am compliant with the whereabouts policy of WADA
5. I am certain that I am compliant with the out of competition testing policy of WADA
6. I am certain that I am compliant with WADA policy on dietary supplement use
7. I am certain that I am compliant with WADA policy on strict liability
8. I am certain that I am compliant with the sample storage policy of WADA
9. I am certain that I am compliant with the sample collection policy of WADA
10. I am certain that I am compliant with the result management policy of WADA

Rating scale: Yes (1) / No (0)

Anti-doping knowledge

The next ten statements are about what athletes can and cannot do under the World Anti-Doping Code.

Read the statement below and decide whether it is True or False.

1. I can use any prescribed medication even if it gives an unfair advantage as long as I have a medical reason for it (False)
2. I cannot refuse to submit a doping control test sample even if I have a good reason (True)
3. I can avoid a sanction if I didn't know that a substance was prohibited (False)
4. I have to update my whereabouts information on the ADAMS system when I am on holiday (True)
5. I can refuse to be tested if a Doping Control Officer arrives at my house unannounced (False)
6. If I am tested positive because of contaminated food or supplements, I will be sanctioned (True)
7. I can take any supplement given to me by my Doctor or Coach without checking if they are prohibited (False)
8. I can ask to have my doping control samples destroyed if I retire from competitive sport (False)
9. When I am selected for doping testing, I can choose the method (e.g., urine, venous blood or fingerpick blood) (False)
10. I can challenge the doping test result (True)

Rating: True (1), False (0), skipped answer (0)

Performance-Enhancement Attitude Scale (PEAS) Short form

(Petroczi, 2002; Petroczi & Aidman, 2009, Folkerts et al, 2020)

Please rate your agreement with the following statements:

1. Doping is not cheating since everyone does it.
2. The health risks related to doping are exaggerated.
3. Doping is not necessary to be competitive. (R)
4. There is no difference between drugs, fibreglass poles and speedy swimsuits that are all used to enhance performance.
5. Legalising performance enhancement would not be beneficial for sports. (R)
6. Doping is an unavoidable part of a competitive sport.
7. Only the quality of performance should matter, not the way athletes achieve it.
8. Athletes should feel guilty about breaking the rules and taking performance enhancing drugs. (R)

Rating scale: strongly disagree (1), disagree (2), slightly disagree (3), slightly agree (4), agree (5) and strongly agree (6).

Scoring: R denotes reversed scoring

Attitude toward anti-doping rule-compliance

Please rate your agreement with the following statements:

For me being compliant with the anti-doping rules on a daily basis is…

1. Difficult - Easy
2. Annoying - Welcome
3. Demanding - Effortless

4. Unmanageable - Manageable
5. Unsettling - Comforting
6. Unimportant – Important

Rating scale: 1 (negative valence) – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10 (positive valence)

Morality

Please ate your agreement with the following statements:

1. Deliberately using doping to improve performance is morally justifiable in some circumstances.
2. Not reporting doping - if known - is morally justifiable in some circumstances.
3. Deliberately assisting someone to use doping is morally justifiable in some circumstances.
4. Covering up for positive doping tests to protect the reputation of the sport or the athlete is morally justifiable in some circumstances.
5. Covering up for positive doping tests to protect competitive advantage is morally justifiable in some circumstances.

Rating scale: strongly disagree (1), disagree (2), slightly disagree (3), slightly agree (4), agree (5) and strongly agree (6).

Trustworthiness

(Dreiskaemper et al., 2016)

Indicate your level of agreement with the following statements. There is no right or wrong answer, rate according to your opinion:

1. All organisations involved in anti-doping are very capable of performing its job in anti-doping
2. All organisations involved in anti-doping are very concerned about the athletes' welfare
3. All organisations involved in anti-doping have a strong sense of justice
4. I feel very confident about anti-doping organisations skills regarding controlling doping in sport
5. Athletes' needs and desires for a fair competition are very important to all organisations involved in anti-doping
6. All organisations involved in anti-doping try hard to be fir in dealing with the athletes
7. All organisations involved in anti-doping are well qualified in all parts of anti-doping
8. All organisations involved in anti-doping really look out for what is important to the athletes
9. Sound principle seem to guide all organisations' behaviour regarding anti-doping

Rating scale: strongly disagree (1), disagree (2), slightly disagree (3), slightly agree (4), agree (5) and strongly agree (6).

Scoring: items 1, 4, 7 (ability), items 2, 5, 8, (benevolence), Items 3, 6, 9 (integrity)