Co-creating a Social Science Research Agenda for Clean Sport: An International Delphi Study

Ian D. Boardley[a], Martin Chandler[a], Susan Backhouse[b], & Andrea Petroczi[c]

[a]University of Birmingham, Edgbaston, Birmingham, United Kingdom. B15 2TT. I.d.boardley@bham.ac.uk; M.chandler@bham.ac.uk

[b]Leeds Beckett University, Headingley, Leeds, United Kingdom. LS16 5LF. S.backhouse@leedsbeckett.ac.uk

[c]Kingston University London, Kingston, London, United Kingdom. KT1 2EE. A.petroczi@kingston.ac.uk

Corresponding author: Ian D. Boardley (I.d.boardley@bham.ac.uk)

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Abstract

Background: Doping in sport is a significant issue. To date, research informing doping prevention has lacked a framework guiding research priorities. To ensure research is coordinated, sustainable and focused on end-user priorities, this study co-created the first research agenda for doping prevention.

Methods: The Delphi method was used to develop this agenda. 82 anti-doping stakeholders with relevant expertise were invited to be panel members. Based upon two substantive reviews of the doping literature and 12 focus groups across five countries, a questionnaire was developed assessing the importance of 15 research topics and identifying research questions. In Round 1, an expert panel ($n = 57$; 70% response rate) completed this questionnaire. In Round 2, panel members ($n = 33$; 58% response rate) ranked for relative importance the eight topic areas rated highest in Round 1, before doing the same for research questions within each topic. Based on these rankings, a draft agenda was created. In Round 3, panel members ($n = 26$; 79% response rate) rated the degree to which they accepted this agenda, the feasibility of its delivery and identified possible barriers and facilitators to implementation.

Results: The results of Round 1 and Round 2 were used to create a draft agenda consisting of 18 research questions stratified across eight topic areas. This agenda was either fully ($n = 16$) or mostly ($n = 9$) accepted by the panel in Round 3 (96.2%). Research topics included the effectiveness of interventions/education programmes, environmental influences, long-term development of protective and risk factors in athletes and their entourage, athletes' experiences of anti-doping procedures and athletes' place in the anti-doping system.

Conclusions: A rigorous exercise created an agenda for doping prevention research. Adoption and application of this agenda should lead to better coordination, more efficient use of funding, enhanced uptake of research findings and more effective doping prevention education.

Key words: anti-doping, policy, clean sport, athlete, doping behaviour, prevention, education.

Introduction

The use of prohibited substances and methods in sport – often referred to as doping – remains a significant global issue. Whilst doping is prohibited in accordance with the World Anti-Doping Code (World Anti-Doping Agency [WADA], 2021a), recent research has reported prevalence rates that suggest it continues to be a concerning issue (Faiss et al., 2020). Unlike drug-control efforts for other forms of drug use, doping prevention is coordinated and harmonized at the global level. This is due to the international nature of most major sport competitions (e.g., Olympics, World Cups, regional Games and Championships). To help coordinate and harmonize doping prevention globally, the WADA is responsible for the drafting, acceptance, and implementation of a harmonized set of anti-doping rules, the World Anti-Doping Code. Previously, this code operated in conjunction with six International Standards (i.e., prohibited list; testing and investigations; laboratories; therapeutic use exemptions; protection of privacy and personal information; code compliance by signatories). However, the latest iteration of the Code – effective from January 2021 – will for the first time introduce Results Management and Education as two new International Standards. The International Standard for Education (ISE) reflects a growing recognition of the importance of education within the policies and practices of the organizations that form the global anti-doping community. In addition, we have seen increased emphasis placed on athletes' rights and the importance of the athlete voice, as evidenced by the development of an Athletes' Anti-Doping Rights Act (WADA, 2020a). As such, empirical research needs to keep pace with the need for evidence-informed practice and the changing landscape within doping-prevention efforts.

Of importance to the current work, the ISE explicitly highlights the value of social-science research for doping-prevention education (WADA, 2020b). Specifically, it (a) encourages signatories to engage and leverage the resources and expertise of researchers and educational institutions, (b) stipulates education programmes should be evidence-based and informed by education theory and social-science research, (c) requires signatories to seek partnerships with academics and members of research institutions to support evaluation and research and (d) suggests social-science research should be used to inform evaluation procedures. Improving the uptake of research evidence into practice – by ensuring a greater degree of collaboration amongst researchers, policymakers, and practitioners – is critical to reducing the gap between research evidence and anti-doping decision making (Backhouse et al., 2016). Failure to bridge the gap between researchers, practitioners and policymakers will limit our ability to deliver relevant, acceptable, and evidence-informed anti-doping policies. As such, researchers in this field should aim to work together with practitioners and policy makers to ensure that research findings are translated to practical and tangible outcomes and are accessible to those who would benefit

from them. However, co-creation in anti-doping can be challenging because researchers, practitioners and policymakers often work to different timeframes, have different priorities, and staff movement may weaken or disrupt the programme of research (Backhouse, 2019). However, it is important to overcome these potential barriers if we are to improve the uptake of research evidence in anti-doping decision making. Moreover, low levels of engagement with social science research at a program and policy level has been identified as a significant concern in WADA's recently published social science strategy. Developing ways to enhance research capability by encouraging partnerships between researchers and anti-doping organizations has been identified as a strategy to improve anti-doping organisation's ability to engage with and translate social science research into practice (WADA, 2020c). The introduction of the ISE not only emphasizes the increased importance of social-science research for doping-prevention education, but also further underlines a previous call for an international consensus on research priorities around doping in sport to guide funding allocations and inform evidence-based policy and practice (Backhouse et al., 2016).

The increased importance placed on social science within anti-doping governance over the past decade represents an augmented focus on primary and primordial prevention. Primary prevention seeks to prevent a '*disorder*' (i.e., doping in the present case) occurring in the first place, by promoting education and preventing exposure to risk factors at the individual level (Leavell & Clark, 1958; Weintraub et al., 2011), whereas primordial prevention seeks to achieve similar outcomes but through changes in policy and the environment rather than targeting the individual (Shrivastav, Nazar, Stigler, & Arora, 2012; Strasser, 1978). Importantly for anti-doping, primary and primordial prevention also seek to protect the entire population from the impact of others *doping*. In contrast, secondary prevention attempts to prevent those exposed to risk factors from progressing to the disorder and tertiary prevention seeks to identify and rehabilitate those who have already done so (Leavell & Clark, 1958). Thus, given the focus on education, identification of risk factors, policy development and environmental influences within social-science research, the development of an agenda to guide and inform research should be grounded within primary and primordial approaches to prevention. The overall aim of such an agenda should be to support the development of environments and policies that promote clean sport and create conditions in which not only the opportunities and motivation for doping are minimised, but the intrinsic desire to be clean is explicitly recognised and supported. In achieving this aim, it would protect the integrity of sport – and athletes' fundamental rights for doping free sport – by helping athletes and athlete support personnel (ASP) uphold clean sport. The focus of this agenda on the promotion of clean sport is consistent with the recent decreased emphasis on tertiary prevention (i.e., detection and punishment of doping)

and increased emphasis on primary prevention (i.e., education). This change in focus is highlighted in the guidelines for the ISE, which indicates education should now be a central priority for all anti-doping programmes, and athletes' first experiences of anti-doping should be through education and not doping control testing (WADA, 2021a). Such progression moves away from the assumption that all athletes would dope unless deterred from doing so, instead building from the assumption that most athletes want to compete clean and the primary role of anti-doping efforts should be to help them to do this.

A research agenda for doping prevention would help inform the funding strategies of organizations who regularly commission research in this field. One major funder of social-science research relevant to anti-doping and clean sport is the WADA. Since 2005, the WADA have coordinated a social science research grant programme aimed at ensuring preventive anti-doping education programmes are evidence informed (WADA, 2020d). To date, this programme has funded 93 projects through almost US$ 3.5 million of research funding. Other notable funders of social science based doping prevention research include the Partnership for Clean Competition, the European Union (EU) through its ERASMUS+ programme and the International Olympic Committee (IOC). Whilst research benefitting from these funding streams has been valuable and has advanced our understanding of doping, there is little doubt that the allocation of funding could be more targeted, coordinated and practically relevant if it were informed by a long-term research agenda. The development of a research agenda could benefit research funders as it should make allocation of resources more efficient by reducing duplication of effort, so different organisations do not fund similar research. It would also help build a comprehensive evidence base around targeted topics over time. Therefore, a research agenda – co-created and agreed by experienced anti-doping researchers/practitioners and key representatives of anti-doping organizations – should have benefits for doping-prevention research funders.

By informing the funding strategies of major research funders, the creation of a research agenda for doping-prevention research would also benefit researchers. At present, researchers applying for research funding for doping-prevention research are often having to respond to funding calls at short notice. For example, historically the WADA release their annual call for social-science research in April/May for a July deadline, and the EU release the call for their ERASMUS+ programme in January for an April deadline. Having to respond to calls in this way makes it difficult to develop and work towards a coordinated long-term research strategy. However, if there was an agreed research agenda in place for the next decade, researchers could align their planned research activities for the coming years according to this agenda. An agreed agenda would also provide a platform for multi-institutional collaborations on long-term programmes of research. Thus, the development of

an agreed research agenda for doping prevention would benefit the quality and relevance of research activities by allowing researchers to develop long-term research strategies aligned with identified areas of priority.

As outlined above, the development of a guiding framework to help coordinate and direct social-science research efforts has the potential to benefit anti-doping practitioners, funding agencies and researchers operating in the field of doping prevention. Further, it could also inform and provide direction for non-funded research including student projects. As such, the primary aim of the current study was to co–create an agenda for doping-prevention research aimed at informing doping-prevention education over the next ten years. In achieving this aim, we sought input from experienced anti-doping practitioners, key representatives of funding organizations and researchers with a strong track record of empirical work on doping prevention.

Methods

Design and Data Collection

To achieve our aim to co–create an agenda for doping-prevention research we employed the Delphi consensus method (Dalkey, 1969; Jones & Hunter, 1995). This involved identifying and recruiting a panel of experts in the field of doping-prevention education to identify the most important research topics for doping prevention, as well as specific questions that need addressing within these topics. Topic areas and research questions rated as being of greatest importance were included in the research agenda, and consensus was then sought on the experts' acceptance of this agenda. Experts were individuals with considerable experience working in the field of anti-doping education (i.e., practitioners), governance (i.e., policy makers) or research (i.e., academics). Our co-creation approach was also supported through members of the Clean Sport Alliance (CSA) team leading the Erasmus+ Collaborative Partnership research project, RESPECT. The CSA is comprised of academics and education managers from National Anti-Doping Organisations (NADOs) representing five European countries. Formed in recognition of the gap between research and practice, the CSA is committed to developing and implementing policies and education programmes that have the greatest likelihood of success. This commitment is reflected in the co-production approach adopted in the current research. CSA members were not part of the expert panel. CSA members contributed to the research through collaboration on the design of the research, its implementation, and the interpretation of data.

Data were collected in three rounds using online questionnaires (see questionnaire development subsection). The first round took place during July and August 2019, with 57 experts completing a questionnaire assessing the importance of 15 pre-determined research topics and identifying potential research questions to be answered within each of these topics. In total, 82 experts were invited, giving an acceptance rate of 69.5%.

Subsequently, the second round occurred between September and November 2019, whereby 33 of the original experts ranked the eight topic areas rated most important in Round 1 for relative importance and doing likewise for research questions for each of the eight topic areas. Finally, the third round was completed during January and February 2020, with 26 of the original experts rating the degree to which they accepted a draft research agenda created based upon the scores from Round 2. In addition, they rated the feasibility of the research agenda's delivery over the next ten years. Panel members also identified possible barriers and facilitators to its delivery.

Recruitment and Characteristics of Expert Panel

Our expert panel consisted of suitably qualified individuals from either an academic or practice-based background, with specific selection criteria for the two backgrounds. Experts from an academic background had to have a minimum of five years' experience researching doping (Yap et al., 2014) and have been the lead author on at least one relevant peer-reviewed publication (Addington et al., 2013). In turn, those from a practice-based background were required to have at least five years' experience working in anti-doping education and have been involved in the development and implementation of a minimum of one anti-doping education programme for their organisation. Those working in anti-doping governance were required to have been in a senior governance position for a minimum of one year. Suitably qualified potential panel members were contacted via email to enquire whether they may be interested in participating. Those expressing interest were sent information providing study details and asked to respond confirming whether they would like to participate. Those volunteering to participate were sent a link to the Round 1 questionnaire. All members of our expert panel volunteered their time to contribute to the project, and no compensation was received for their services. The front page of the questionnaire informed participants that by proceeding to the survey they were consenting to participate in the study. The demographic characteristics of our expert panel evidenced heterogeneity with respect to profession, age, gender, ethnicity, and geographical location across all three rounds (see Table 1 and Table 2). In total, 30 countries were represented in Round 1, 19 in Round 2 and 17 in Round 3.

Questionnaire Development

Each round of the Delphi involved completion of a specifically designed online questionnaire by a panel of experts. For the first round, the online questionnaire consisted of five sections. The first section was designed to collect demographic information including evidence of relevant expertise. The second section then presented 15 research topics and asked respondents to rate each of these for importance using a scale from 1 (*No Importance*) to 5 (*Maximum Importance*). The 15 research topics were derived from the findings of two substantive reviews

of the doping literature (i.e., one for quantitative research and one for qualitative research) and a multinational study involving focus groups with elite athletes across five European countries (Petroczi et al., in revision) which were part of the same overall research project as the Delphi study. From the substantive reviews, we identified areas of importance for which there were clear gaps in research evidence such as long-term studies examining the development of protective and risk factors for doping in athletes. In contrast, questions stemming from the focus groups reflected key areas of research identified by athletes (e.g., athletes' experiences of key procedures [e.g., whereabouts system] within the anti-doping system, perceived disparity in all aspects of anti-doping across countries, and importance of early year experiences and the environment). In the third section of the questionnaire, respondents were asked to name one specific research question or issue they would most like to see addressed for each of the 15 research topics. In the fourth section, participants responded to two questions: a) "If you were going to design and implement a ten-year global clean-sport research programme; what would be the two to three MAIN research themes or questions you would cover in the programme?", and b) "What key technical or policy issues would be accounted for in the research programme?". Finally, respondents were given the opportunity to make any further comments on the survey.

Consistent with the Delphi approach, the Round 2 questionnaire was designed based upon the results from Round 1. There were two major sections in this questionnaire, with the first being rank-order assessments of the research topics identified as being important in Round 1. Specifically, the eight topics rated as having highest importance in Round 1 were presented to respondents, who were then asked to rate their relative order of importance on a scale of 1 (*MOST Important*) to 8 (*LEAST Important*). In addition, we developed potential research questions for each of the eight topic areas based upon suggestions from Round 1. These research questions were presented in the second section of the questionnaire, asking respondents to rank the suggested research questions in terms of their relative importance for each topic area separately. The anchors (i.e., MOST Important and LEAST Important) were identical to those for the ranking of research topics, but the number of response options differed based upon the number of research questions presented. This number ranged from three (i.e., Organisational and managerial structures and strategies that best facilitate effective anti-doping education) to nine (i.e., Developmental influences [e.g., parental, peer, school education, etc.] on young athletes regarding doping and clean sport).

In the final round, the questionnaire was framed by an initial draft of the research agenda developed using the Round 2 importance rankings. Specifically, the draft research agenda (see Figure 1) consisted of the eight research topics identified as most important in Round 1, presented in ascending order of importance based

upon the rankings derived during Round 2. Also, underneath each topic area was between one and four research questions, with an increasing number of research questions allocated to topic areas that were ranked of higher importance in Round 2. During Round 3, this research agenda was presented to respondents, who were asked to rate aspects of it and provide comments. First, they indicated the degree to which they accepted the draft agenda on a scale from 1 (*I do not accept it at all*) to 4 (*I accept it fully*). Next, they indicated how feasible they thought it was to answer 100% of the questions in this research agenda in the next 10 years given current funding levels, using a scale from 1 (*Completely Unfeasible*) to 7 (*Completely Feasible*). This assessment was then repeated for 50% delivery of the research agenda. Following this, respondents indicated whether they thought successful delivery of the research agenda would require external organisational coordination, scoring 1 (*No*), 2 (*Not Sure*), or 3 (*Yes*). Finally, open comments were invited on main barriers and facilitators to the successful delivery of this research agenda.

Data Analysis

For quantitative data, data analyses involved comparisons of mean ratings and rankings of importance from experts. In turn, we analysed our qualitative data through thematic analysis as described by Riessman (2008), whereby the focus is primarily on the content (i.e., what is said). We chose this approach because it is useful for identifying patterns of meaning (i.e., themes) within qualitative data and interpreting their importance (Braun, Clarke, & Weate, 2016). This involved the first author conducting multiple readings of the responses to become familiar with their content, making notes to document the key themes across the experts' responses.

Results

Round 1

Table 3 presents the ratings of importance for the 15 research topics. Mean ratings ranged from 2.49 (i.e., consistency in the use of anti-doping promotional materials) to 4.59 (i.e., Long-term studies examining the development of protective and risk factors for doping in athletes). Panel members were also asked to identify one key question to be answered in each topic area. The number of questions proposed for topics varied, ranging from seven (i.e., Effectiveness of anti-doping promotional materials) to 28 (i.e., Developmental influences [e.g., Parental, Peer, School education], etc.) on young athletes with regards to doping and clean sport), with a mean average of 18.1 questions proposed.

Following this, 43 panel members responded when asked to provide up to three research themes or questions they would cover in a 10-year research programme, providing a total of 96 further research themes (e.g., "Consequences of doping abuse on physical and mental states of doping positive athletes") and questions

(e.g., "What is the best proxy for (anti)doping as an outcome variable?"). Finally, 21 respondents provided technical (e.g., "The importance of strong research designs [e.g., prospective, longitudinal, and experimental] for the social science of anti-doping") or policy (e.g., "Has the time come to drop the pursuit of harmonisation and implement more sport-specific anti-doping rules?") issues that could be accounted for in the research programme, identifying 28 issues in total. A full list of the research questions, research themes and technical and policy issues proposed can be found in the additional materials.

Round 2

Mean rankings for the eight research topics identified as being of greatest importance in Round 1 can be found in Figure 2. These values indicate the relative importance of the eight topics, showing a mean ranking of 2.73 for the topic ranked as most important (i.e., "Effectiveness of anti-doping interventions/education programmes, including development, implementation and long-term evaluation") and 4.85 for the topic ranked as least important (i.e., "The anti-doping system and athletes' experiences of key procedures [e.g., whereabouts, testing, therapeutic use exemption etc.] within it"). Table 4 illustrates the mean rankings for the research questions for each of the eight research topics. These values indicate the relative importance for the research questions proposed for each of the eight research topics.

Round 3

Regarding the degree to which they accepted the draft research agenda, 61.5% (i.e., $n = 16$) of panel members accepted it fully, 34.6% ($n = 9$) accepted it partly but would like some small changes and 3.8% (i.e., $n = 1$) did not accept it at all. Regarding those who partly accepted the agenda, there was no common theme to the suggestions for minor revisions. For example, some experts made suggestions regarding additional topics they would like to see: "Would also like to see something on effects of the ongoing commercialisation and medicalisation of sport"; "Wider environmental factors of the sport system and anti-doping system… Examine motivations to dope beyond performance enhancement". In contrast, one or two others suggested the ordering of the topics should be adjusted slightly: "For me, research areas 4 and 5 are more important than research area 3"; "Number 4 should be number 8". As there were no common themes to the minor changes suggested, the consensus was to accept the agenda in its present form and not to not make any further changes (see Figure 1).

With respect to the feasibility of delivering 100% and 50% of the research agenda over the next 10 years given current funding levels, there was limited consensus regarding the feasibility of delivering 100% of the research agenda (see Figure 3). In contrast, 76.9% of panel members rated the feasibility of delivering 50% of the agenda as a 6 or 7 on a scale of 1-7, with 50% rating it as 7 (i.e., completely feasible). Finally, in terms of

whether they thought the successful delivery of the research agenda would require organizational coordination; 88.5% (i.e., $n = 23$) of panel members answered yes, 7.7% ($n = 2$) were not sure and 3.8% (i.e., $n = 1$) answered no.

Our analysis of the qualitative data on barriers to delivery identified three main themes. The first was insufficient research funding. Several panel members suggested that without adequate research funding it would not be possible to conduct the high-quality research required to deliver the research agenda successfully. For instance, when asked to identify barriers to delivery, one member stated: "Lack of funding - especially for long-term follow up studies.". Several other panel members made similar comments, including "Financial resources", "Lack of funding" and "Low level of financing for educational programmes from the government" as barriers to delivery.

The second theme was lack of stakeholder engagement. Across several experts, there was a feeling that failure to engage key stakeholders (e.g., WADA, NADOs, Sport Governing Bodies) with the research agenda would make it difficult to recruit participants, disseminate findings and influence policy and practice. For example, one expert suggested limited "…cooperation and willingness of support by potential research subjects and sport federations" would likely represent a barrier to delivery. Along similar lines, others identified a "Lack of engagement from stakeholders" and "Lack of buy in by stakeholders" as potential barriers.

The final barrier to implementation related to characteristics of researchers and the research context. Here, it was suggested that disparate geographical locations of researchers (i.e., different continents), siloed researchers/research teams, competing interests among researchers, limited numbers of suitably skilled researchers and insufficient institutional support for doping-prevention research could undermine the global collaborative effort required to deliver the agenda. One panel member recounted: "Currently, I have the impression there is still some competitive attitude between some research groups instead of collaboration even though this has improved lately." Other exemplar responses included "Geographical divide among scientists working in this area", "…personal/professional interests and competing academic partners", "Lack of anti-doping research specialists" and "…level of expertise of the person doing the research". Of the sub-themes observed, the limited number of suitably skilled researchers working in the area was mentioned most frequently.

Regarding facilitators to implementation, data analysis identified four major themes. The first of these – perhaps unsurprisingly given the main barrier identified was limited resource – was upscaled research funding. There was a common feeling among panel members significant investment in social science research would support the kind of long-term research programmes needed to target and deliver specific aspects of the agenda.

For instance, one expert panel member identified the need for "…long-term grants, so that sufficient attention can be paid to the topics developed". Another suggested, "If we believe that research into prevention is crucial to the future of anti-doping then we need to put financial resources, time and effort behind it.". More succinctly, others responded with "Clearly more funding", "Funding" and "Additional funding".

The second theme highlighted the importance of collaborative networks. Here, it was proposed that collaborative networks involving representatives from research groups and key stakeholders would facilitate inception, funding, delivery, and implementation of the high-quality research required to deliver the agenda. Good examples of responses relevant to this theme were "It needs to be a concerted effort from all anti-doping stakeholders", "Openness of research and anti-doping community to achieve a common goal" and "A strong movement or semi organized structure consisting of several strong stakeholders". In general, there was a strong feeling that such collaborative efforts would help deliver high-quality research and implement it within education programmes.

Third, support and leadership from key organisations was a recurring theme amongst the facilitators to implementation. Suggestions here reflected the feeling that explicit support for the research agenda from influential organisations (e.g., the WADA, IOC, International Paralympic Committee (IPC), United Nations Educational, Scientific and Cultural Organization, Institute of National Anti-Doping Organisations, National Olympic Committees, SportAccord, Governments, Funding Agencies) and even coordination of it would encourage stakeholder engagement and increase the likelihood of its delivery. For instance, one panel member suggested, "Ideally WADA should put pressure on their stakeholders to engage - targeted pushing is better than generic!", whereas another stated "Somebody needs to take the responsibility as a coordinator and effective cooperation". In terms of which organisations could coordinate the delivery of the agenda, a range were put forward. One expert suggested, "Could be WADA, could be the EU, could be the IOC. But someone has to step up and must have the confidence of researchers and athletes and subjects.", whereas another responded, "WADA, iNADO, SportAccord, IOC, IPC, Governments, Medical Agencies".

Finally, research collaboration was also a strong theme, suggesting the existence of a globally connected group of collaborative and capable researchers committed to advances in research methodologies would enable the delivery of a high-quality evidence base to inform policy and practice. A good example of a response relevant to this theme is, "I would be more confident, if we as researchers could manage a closer international cooperation to address these different topics. Such cooperation would, in my opinion, also enhance the chances of getting more funding.". Another respondent identified the need for a "Worldwide group of

motivated and expert researchers". Finally, another expert suggested there is a need to "…set up a new research group which includes key people who work in this field who could coordinate this together. If you keep all research areas, you perhaps could form a group of which each person leads a certain area. This person would of course be a leading figure in that particular field."

Discussion

By engaging skilled anti-doping practitioners, senior governance officers and experienced researchers in a Delphi study, we achieved our aim of co–creating an agenda for doping-prevention research aimed at informing doping-prevention education over the next decade. Adoption of this research agenda has the potential to support the development of environments and policies that promote clean sport and create conditions in which the opportunities and motivation for doping are minimised. In doing so, we answered calls to achieve international consensus on research priorities for doping prevention (Backhouse et al., 2016). The research agenda we developed consists of 18 research questions across eight research topics, with topics relating to the effectiveness of anti-doping interventions/education programmes, developmental influences on doping, factors relating to ASP and those requiring long-term research programmes. We also collected data on key barriers and facilitators to delivery of the research agenda. Over the coming paragraphs we discuss the main findings of this research, as well as making recommendations on how to maximise the likelihood of the delivery of this research agenda over the coming decade.

Research needs

The highest priority area for future research was examining the effectiveness of anti-doping interventions and education programmes. To date, there has been a dearth of such evaluations (see Backhouse, et al., 2016; Ntoumanis et al., 2014), and those that do exist have largely been conducted on interventions distinct from those employed by NADOs and National Governing Bodies (e.g., Barkoukis et al., 2016; Lucidi et al., 2017). Exceptions to this are a small number of studies that have evaluated existing programmes (e.g., Hurst et al., 2019; Wippert & Fließer, 2016). This means most education programmes are not publicly evaluated, and for those that are their evaluation is not an integral part of their design. However, as highlighted in the current agenda and encouraged in the ISE (WADA, 2021b), the development, implementation and evaluation of interventions and education programmes should be an integrated process involving both anti-doping practitioners and researchers. Ideally, those looking to answer questions relevant to this aspect of the research agenda should engage in collaborative projects involving practitioners and researchers (WADA, 2021b), and look to include both process and outcomes evaluations (see Craig et al., 2008).

Another area of importance was athlete support personnel (ASP), with three research topics and six research questions relating to them. Specifically, topic areas related to the role of ASP in anti-doping and clean sport, ASP's knowledge and understanding of specific prohibited substances and methods and long-term studies examining the development of protective and risk factors for doping in ASP. Whilst recent qualitative (e.g., Boardley et al., 2019a) and quantitative (e.g., Boardley et al., 2019b) work has started to identify coach characteristics associated with athletes' proclivity to dope and susceptibility to inadvertent doping, there is still a dearth of knowledge around the role of other ASP (e.g., physiotherapists, doctors, agents) in developing social environments that may or may not be conducive to doping (see Backhouse et al., 2018). More research is also needed that examines the environments created around ASP and the influence they have on ASP's attitudes and behaviours relating to clean sport (e.g., Allen, Morris, Dimeo, & Robinson, 2017; Patterson & Backhouse, 2018). Also, as with other areas of doping research, there is a need for field-based interventional research focused on ASP (see Ntoumanis et al., 2014). Such studies are beginning to emerge (e.g., Ntoumanis et al., in press) but greater collaborative research efforts are required to establish this much needed evidence base.

We also identified areas of research in need of longitudinal research. Specifically, these areas were long-term studies examining the development of protective and risk factors for doping in athletes and ASP. Although researchers have examined questions relating to these two areas, cross-sectional designs have tended to prevail (e.g., Boardley et al., 2017; Petróczi, 2007). As a result, our understanding of the temporal and within-person sequencing of protective and risk factors for doping in athletes and ASP are severely limited. This is worrying as many theories underpinning research in this area are process based. The most appropriate way to test process-based theories is to examine temporal changes in single variables, as well as how changes in different variables are related over time (see Stenling et al., 2016). Thus, the increased application of longitudinal designs accompanied by suitable analytical frameworks (e.g., latent growth modelling) would represent a significant step forward for doping-prevention research. Such research would allow us to identify whether within-person changes in pertinent protective and risk factors for doping (e.g., self-regulatory efficacy, doping attitudes) are related to within-person changes in doping behaviour, and whether any such effects are reciprocal. We could also further our understanding on how between-person differences in mean levels of protective and risk factors for doping predict levels and rates of change for doping behaviour. It is important to point out though, the current model of funding individual projects with limited amounts of funding means this type of research – as much as it is needed – is extremely difficult to resource and deliver at present.

Barriers and facilitators

By looking for related themes across barriers and facilitators, it is possible to identify some important actions that should be pursued to facilitate delivery of the research agenda. One potential barrier to delivery was insufficient research funding, with several experts suggesting there was a need to upscale research funding if we are to conduct the high-quality research needed to develop effective anti-doping education programmes. Indeed, the need for greater research funding to heighten the quality of doping-prevention research has been highlighted previously (Backhouse et al., 2016). Traditionally in anti-doping, far more funding has been allocated for medical-science research (i.e., testing-focused) than for social science research (Mazanov, 2009). Large-scale research funding could support long-term research programmes delivering specific aspects of the agenda. However, greater investment in social science research to bring funding allocations more in line with medical-science research may be needed to help facilitate such programmes. As outlined earlier, the development of the ISE hopefully reflects an increased importance being placed on social-science research within anti-doping governance. However, this needs to be backed-up with increased financial investment – moving towards greater parity with investment in detection-deterrence approaches – if the research agenda is to be successfully delivered through high-quality research, policy development and evidence-informed practice. In terms of implementation there may therefore be a need to lobby funding agencies such as the WADA and IOC for increased funding for social-science research. Facilitating the harmonisation of funding priorities across funding agencies (e.g., WADA, IOC, EU, PCC) in line with the research agenda would also help ensure research funds are allocated efficiently. Funding could also be strategically allocated to collaborative research networks with suitable experience and skills to ensure available funding is allocated frugally and in a way that maximizes return on investment.

Another potential barrier to delivery was a lack of stakeholder engagement, based upon the belief that if key stakeholders were not engaged with the research agenda it would be difficult to recruit participants during the research process and then to disseminate findings to non-academic audiences. This would then make it difficult to subsequently influence policy and practice. To overcome this barrier, it may be prudent to establish a long-term collaborative network including representatives of anti-doping organisations, sport federations, research groups, anti-doping practitioners and athletes. Such a network could oversee all stages of the research process, including inception, funding, delivery, and implementation to ensure the quality and impact of research efforts are maximised. In doing so, it could facilitate transdisciplinary doping-prevention research, through which stakeholders can contribute to research design and maximise the relevance of research for stakeholder communities (Kania & Kramer, 2011; Menken & Keestra, 2016; Viret, 2020). Further, if influential

organisations (e.g., the WADA, IOC, IPC, Institute of National Anti-Doping Organisations [iNADO]) contributed to such a network, this may stimulate and encourage further stakeholder engagement within the network. Ideally, such organisations could act as signatories of the research agenda to make explicit their support for it, and one globally connected organisation (e.g., WADA) could externally coordinate its delivery. In doing so, this would explicitly endorse the value of social-science research in contributing to the development of effective doping prevention policy and practice.

The final major barrier to delivery related to aspects of the research context with the potential to impede delivery. Specifically, isolated research groups located across a small number of disparate locations (i.e., Australia, Europe, USA), researchers working within narrow disciplinary boundaries, competing interests across research teams, a dearth of researchers with sufficient relevant knowledge and skills, lack of access to high-level athletes and research institutions not viewing doping-prevention research as a priority could undermine the global collaborative research approach required. To counter these issues, it was suggested collaborative research networks/centres – as seen for other research areas – consisting of researchers covering a range of experiences and research skills, could be created. For instance, the UK Centre for Tobacco and Alcohol Studies (https://ukctas.net/index.html) is a network of 13 universities (12 in the UK, one in New Zealand) funded by the UK Clinical Research Collaboration conducting research into tobacco and alcohol use. Similarly, the European Organisation for Research and Treatment of Cancer (2020) is an independent, non-profit cancer research organization present in 37 countries and consisting of over 5300 scientists. Likewise, the World Health Organisation maintains a list of collaborating centres to provide relevant expertise in key areas to help it deliver its mandated work (WHO, 2020). The existence of similar networks/centres focused on doping prevention would not only counter the aforementioned barriers to the delivery of the research agenda, but also allow funding bodies to confidently invest in the long-term programmes of research required to deliver it most successfully. A good example of such a collaborative research network currently operating within the field of doping prevention is the CSA (2020), to date consisting of representatives from four academic institutions and six NADOs from across Europe. To be fully effective though, such networks need to be globally representative and draw in longer-term funding to ensure their sustainability and impact.

Limitations and Future Directions

Although we successfully achieved our aims, as with any research there are some limitations that should be acknowledged and considered. First, the Delphi poll was conducted entirely in English, and as such the ability to communicate in English was a pre-requisite for expert panel membership. This will have prevented

input from relevant non-English-speaking experts who could have introduced perspectives and ideas not represented in our panel. Nonetheless, due to the global sport competition and co-operation in anti-doping, it was a reasonable assumption that there are staff members at NADOs in non-English speaking countries who were competent to participate in English.

A further limitation is the geographical representation. Although we managed to recruit expert panel members from six continents, there was far more representation from Europe, Australasia, and North America than from South America, Asia, and Africa. This may have led to some cultural nuances and culture-specific issues being missed. However, although we did try to recruit more panel members from these regions, this proved very challenging. This was likely due – at least in part – to the limited engagement with social science research in these areas of the globe. Accordingly, enhancing social science research capability in under-represented geographical regions is identified as a strategic priority in WADA's social science research strategy (WADA, 2020c). Owing to the nature of the Delphi method – which was used to determine consensus globally – our approach was not appropriate for identifying local, culturally specific, issues. Thus, smaller scale targeted investigations through localised Delphi polls, or different methods such as community-based participatory action research, are needed to identify and address such issues (Tremblay, Martin, Macaulay & Pluye, 2017).

We experienced a significant drop-off in participation within our expert panel from Round 1 to Round 2, which is unfortunately not uncommon in Delphi studies with a high number of items (Gargon, Crew, Burnside & Williamson, 2019). The most significant drop-off was seen in panel members from NADOs, meaning that Round 2 and 3 had more relative input from the academic community compared to Round 1. However, as almost a third of our expert panel were still representatives of NADOs at the later time points, this should not have had a significant impact on our findings. We can also draw confidence from the good diversity in global representation and gender across all three phases of the research (see Tables 1 and 2).

It is possible future structural and environmental factors may alter the relative importance of research topics and questions, and/or dictate new ones should be added. Thus, possible emerging areas of research worthy of research should continue to be monitored. Beyond this, there may also be a need for a further exercise that focuses specifically on the identification of areas for future research that go beyond immediate need. Such an exercise should facilitate creative thinking, engendering the potential to unearth new approaches to research on doping prevention and research topics and questions that go beyond those identified presently, which were quite rightly identified based upon the current anti-doping and clean sport landscape. Through such horizon

scanning, it may be possible to 'future proof' doping prevention efforts by identifying and addressing potential issues before they emerge and take hold.

Conclusion

Through a robust line of research involving a global panel of experts over three rounds of data collection, we established the first ever research agenda for social science doping research that provides immediate benefits for academics, practitioners, and policy makers. For researchers, the agenda provides a clear roadmap to guide and inform their efforts towards impactful research. Regarding practitioners, the agenda's delivery will help ensure researchers are addressing issues that organisations need solving and more of their work is informed by robust research evidence. With respect to policy makers, delivery of the agenda will inform policies on education, including which groups (e.g., athletes, parents, ASP) should be targeted and when. The findings relating to barriers and facilitators can inform policies on how to fund and support doping prevention research and support the adoption of collaborative transdisciplinary approaches in its delivery. This contribution is important given the imminent release of the ISE, its focus on research that is of direct practical relevance and its co-creation with researchers, practitioners and policy makers which should help maximise utilisation and stakeholder buy-in and utilisation.

Acknowledgements

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Table 1. Gender, Age and Main Roles of Expert Panel Members

Round Number	Gender (%)	Age Category (%)				Main Role (%)				
	Male	18-29	30-39	40-49	50+	Academic	NADO	Sports Federation	Athlete	Other
1 (*n* = 57)	58.9	3.6	36.4	36.4	23.6	29.8	42.1	12.3	8.8	7.0
2 (*n* = 33)	64.5	6.3	31.3	34.3	28.1	42.4	27.3	21.2	9.1	0
3 (*n* = 26)	65.4	3.8	34.6	34.6	27.0	42.3	30.8	23.1	3.8	0

Table 2. Ethnicity and Continent of Residence of Expert Panel Members

Round Number	Ethnicity (%)						Continent of Residence (%)					
	White European	White Non-European	Mixed	Asian	Black Caribbean	Other	Europe	Australasia	South America	North America	Asia	Africa
1 (*n* = 57)	39	6	5	1	3	2	28	10	6	10	1	1
2 (*n* = 33)	23	3	1	1	1	3	16	6	4	4	1	1
3 (*n* = 26)	20	3	2	1	0	0	14	5	2	3	1	1

Note. One participant in Round 1 and Round 2 did not report their ethnicity or country of residence.

Table 3. Mean Expert Ratings of Importance for the 15 Research Topics from Round 1

Research Topic	Mean
Consistency in the use of anti-doping promotional materials	2.49
Effectiveness of anti-doping promotional materials	2.96
Misuse of key procedures within the anti-doping system (TUE, whereabouts etc)	3.82
Athletes' knowledge and understanding of specific prohibited substances and methods	4.02
Consistency in implementation of anti-doping control across different countries/organisations	4.04
Organisational and managerial structures and strategies that best facilitate effective anti-doping education	4.04
Athletes' experiences of key procedures (e.g., ADAMS, whereabouts, testing, TUE etc) within the anti-doping system	4.06
Cost effectiveness of anti-doping interventions/education programmes	4.06
Clean athletes' perceptions of their representation and support within the anti-doping system	4.08
Athlete support personnel's knowledge and understanding of specific prohibited substances and methods	4.25
Long-term studies examining the development of protective and risk factors for doping in athlete support personnel	4.33
Developmental influences (e.g., Parental, Peer, School education, etc) on young athletes with regard to doping and clean sport	4.37
Explore the role of athlete support personnel (coaches, doctors, agents) in anti-doping and clean sport	4.46
Effectiveness of anti-doping interventions/education programmes, including development, implementation and long-term evaluation	4.54
Long-term studies examining the development of protective and risk factors for doping in athletes	4.59

Table 4. Mean Rankings of Research Questions for Eight Research Topics in Round 2

Research Question	Mean Ranking
Effectiveness of Anti-Doping Interventions/Education Programmes, Including Development, Implementation and Long-Term Evaluation (1-8 Ranking)	
Are the current anti-doping interventions and education programmes effective in changing evidence-based risk factors, and why is this (not) the case?	*2.97*
Can we develop reliable standardised tools to measure the effectiveness of anti-doping education programmes and interventions, and if so, what do these look like?	*3.06*
What are the most effective mechanisms within current anti-doping interventions and education programmes?	*3.13*
What is the long-term effectiveness of current anti-doping interventions and education programmes?	*3.40*
Can education be targeted and tailored, yet consistent in quality, across sports and countries, and if so, how can this be achieved?	4.06
Does the effectiveness of anti-doping education programmes and interventions vary between sports and cultures?	4.26
How does the current implementation of anti-doping education compare across countries and organisations?	5.00
Do certain organisational and managerial structures and strategies impede education initiatives, and if so, how can this be improved?	5.68
Developmental Influences (e.g., Parental, Peer, School Education, etc.) on Young Athletes Regarding Doping and Clean Sport (1-8 Ranking)	
Who are the key influencers for athletes' doping attitudes, and can these influencers be used to promote clean sport?	*2.73*
Which specific influences exert most influence on young athletes' doping attitudes at key points in the developmental process?	*3.24*
How and when do doping-related attitudes develop in young athletes?	*3.82*
Is adding clean sport and anti-doping education to the school curriculum an effective means of promoting clean sport?	4.06
Does culture influence the development of athletes' attitudes towards doping, and if so how?	4.33
Which environmental factors most influence a young athlete's clean sport values?	4.48
Can young athletes' psychological and behavioural functioning regarding doping and clean sport be influenced through their entourage, and if so, how can this be used to promote clean sport?	4.73
How can parents be used most effectively to promote clean sport?	4.76
The Role of Athlete Support Personnel (e.g., Coaches, Doctors, Agents) in Anti-Doping and Clean Sport (1-6 Ranking)	
Which ASP are most influential on athletes' development of attitudes towards clean sport and doping?	*1.93*
Does the influence of specific ASP on athletes' development of attitudes towards clean sport and doping differ by sport, country, gender or culture, and if so, in what way?	*2.52*
How do different ASP see their role in clean sport and anti-doping?	*3.06*
Do athletes think ASP vary in their influence on athletes' attitudes and behaviours towards clean sport and anti-doping, and if so, in what way and why?	3.47
Can interactions amongst ASP be improved to reduce doping and promote clean sport?	3.53
Do ASP interact with each other in addressing doping and promoting clean sport, and if so, in what way?	3.93
Athlete Support Personnel's Knowledge and Understanding of Specific Prohibited Substances and Methods (1-6 Ranking)	

What are the most effective methods for educating ASP around anti-doping and clean sport?	*2.03*
Should ASP receive specific training on clean sport and anti-doping tailored to their particular support role, and if so, what training should they receive?	*2.61*
Does embedding anti-doping and clean sport education within professional qualifications lead to improved knowledge, engagement and confidence in addressing doping issues in comparison to independent training sessions?	2.67
Does the requirement for ASP to produce results in competition impact their engagement with anti-doping and clean sport education, and if so how?	3.27
Where do ASP look for support on clean sport and anti-doping?	4.33
Does the requirement for ASP to produce results in competition impact their engagement with anti-doping and clean sport education, and if so how?	4.39

Long-Term Studies Examining the Development of Protective and Risk Factors for Doping in Athletes (1-8 Ranking)

Does the influence of protective and risk factors for doping in athletes fluctuate over time, and if so how and why?	*3.58*
Is there a chronology of factors that should be targeted throughout an athlete's career to deter doping and promote clean sport?	*3.61*
Is the influence of protective and risk factors for doping in athletes different across groups (e.g., sports, cultures, genders), and if so, how and why?	3.68
Do sport-specific cultures, athletes' backgrounds and other factors combine to influence the development of protective or risk factors for doping, and if so, how and why?	3.71
What are the main trigger points that put athletes at increased risk of doping?	3.93
Does athletes' stage of career progression affect the impact of protective and risk factors?	4.13
To what degree can long-term protective factors against doping be developed in athletes who are deficient in them?	4.23
Does a results-driven organisational culture represent a risk factor for doping in athletes, and if so, how can this be managed?	4.68

Clean Athletes' Perceptions of Representation and Support for them within the Anti-Doping System (1-11 Ranking)

What are the most effective mechanisms for athletes to feedback on their experiences of the anti-doping system?	*4.79*
Do clean athletes feel they are represented in the anti-doping system, and can this be improved?	*4.82*
How can we maximise athletes' engagement with anti-doping organisations?	4.85
How does the degree to which athletes perceive anti-doping organisations as primarily punitive or supportive influence their attitudes towards doping?	4.91
Do clean athletes feel they can influence the anti-doping system and how can this be improved?	5.18
Do athletes' perceptions of transparency in the anti-doping system affect their engagement with this system, and if so how?	5.33
Do athletes see anti-doping organisations as primarily punitive or supportive?	5.36
How do athletes perceive transparency within the anti-doping system?	5.64
Are effective mechanisms in place for athletes to feed back on their experiences of the anti-doping system?	5.67
Do athletes value transparency within the anti-doping system, and if so why?	5.85
Does using athlete ambassadors influence the effectiveness of anti-doping education, and if so how?	6.42

Long-Term Studies Examining the Development of Protective and Risk Factors for Doping in Athlete Support Personnel (1-7 Ranking)

What are the main trigger points that put ASP at increased risk of supporting doping?	*2.84*
Does the influence of protective and risk factors for doping in ASP fluctuate over time, and if so how and why?	3.29

To what degree can long-term protective factors against doping be developed in ASP who are deficient in them?	3.55
Is there a chronology of variables that should be targeted during ASPs' careers to deter doping and promote clean sport?	3.67
Is the influence of protective and risk factors for doping in ASP different across groups (e.g., sports, cultures, genders), and if so, how and why?	3.71
Does a results-driven organisational culture represent a risk factor for doping in ASP, and if so, how can this be managed?	3.74
Do sport-specific cultures, ASPs' backgrounds and other factors combine to influence the development of protective or risk factors for doping, and if so, how and why?	3.87
The Anti-Doping System and Athletes' Experiences of Key Procedures (e.g., ADAMS, Whereabouts, Testing, TUE Etc.) within it (1-15 Ranking)	
Can the anti-doping system be simplified, and if so how?	*5.63*
How do athletes perceive the consistency of anti-doping control across different countries?	5.97
How do athletes perceive the consistency of anti-doping control across different organisations?	6.00
Do athletes perceive certain anti-doping systems (e.g., TUE's) are misused, and if so, what are the consequences of this?	6.23
Do athletes think specific anti-doping systems (e.g., whereabouts) should be changed and if so how?	6.53
Is there evidence to support the misuse of specific anti-doping systems (e.g., TUE's)?	6.77
How do athletes perceive their needs regarding anti-doping education?	6.84
How does the current implementation of anti-doping controls and education compare across countries and organisations?	7.00
How do athletes perceive specific systems (e.g., ADAMS) within the anti-doping system?	7.21
What are the main barriers to athletes' use of specific anti-doping systems (e.g., TUE system)?	7.28
How should the international anti-doping system be organised to promote consistency in delivery?	7.31
How can we promote athletes' engagement with specific anti-doping systems (e.g., ADAMS)?	7.32
Would simplifying the anti-doping system increase engagement?	7.34
How should the international anti-doping system be organised to promote optimisation of resources	7.47
Do the different facets of the anti-doping system (e.g., detection, deterrence, education) complement one other, and if so how?	8.00

Note. Research questions included in the final research agenda are shown in italics. Anchors for rankings were 'Most important' and 'LEAST important

Figure 1. Research Agenda Presented in Round 3

Research Area 1: Effectiveness of anti-doping interventions/education programmes, including development, implementation and long-term evaluation
Question 1: Are current anti-doping interventions and education programmes effective in changing evidence-based risk and protective factors for doping, and why is this the case?
Question 2: Can we develop reliable standardised tools to measure the effectiveness of anti-doping education programmes and interventions, and if so, what do these look like?
Question 3: What are the most effective processes within current anti-doping interventions and education programmes?
Question 4: What is the long-term effectiveness of current anti-doping interventions and education programmes and does this vary between different sports and cultures?
Research Area 2: Developmental influences (e.g., parental, peer, school education, etc.) from outside of sport on young athletes regarding doping and clean sport
Question 1: Who are the key influencers of athletes' thoughts, feelings and behaviours related to doping, and can they help promote clean sport?
Question 2: Which specific factors exert most influence on young athletes' doping-related thoughts, feelings and behaviours at different stages (e.g., sampling, specialising, investment) of the developmental process?
Question 3: How and when do doping-related thoughts, feelings and behaviours develop in young athletes?
Research Area 3: The role of athlete support personnel (e.g., coaches, doctors, agents) in anti-doping and clean sport
Question 1: Which athlete support personnel are most influential on athletes' thoughts, feelings and behaviours towards doping and clean sport?
Question 2: Does the influence of specific athlete support personnel on athletes' development of thoughts, feelings and behaviours towards doping and clean sport differ by sport, country, gender or culture, and if so, in what ways?
Question 3: How do different athlete support personnel view their role in anti-doping and clean sport?
Research Area 4: Athlete support personnel's knowledge and understanding of specific prohibited substances and methods
Question 1: What are the most effective methods of educating athlete support personnel around anti-doping and clean sport?
Question 2: Should athlete support personnel receive specific training on anti-doping and clean sport tailored to their particular support role, and if so, what training should they receive?
Research Area 5: Long-term studies examining the development of protective and risk factors for doping in athletes
Question 1: Does the influence of protective and risk factors for doping in athletes fluctuate over time, and across different groups (e.g., sports, cultures, genders) and if so, how and why?
Question 2: Is there a chronology of factors that should be targeted at different stages in an athlete's career to deter doping and promote clean sport?
Research Area 6: Clean athletes' perceptions of their representation and support within the anti-doping system
Question 1: What are the most effective processes for athletes to feedback on their experiences of the anti-doping system and are they currently in place?
Question 2: Do clean athletes feel they are represented in the anti-doping system, and how can this be improved?
Research Area 7: Long-term studies examining the development of protective and risk factors for doping in athlete support personnel
Question 1: What are the main triggers that put athlete support personnel at increased risk of supporting doping?
Research Area 8: The anti-doping system and athletes' experiences of key procedures (e.g., ADAMS, whereabouts, testing, TUE etc.) within it
Question 1: Can the anti-doping system be simplified, and if so how?

Ascending Priority

Figure 2. Mean Rankings of Eight Research Topics in Round 2
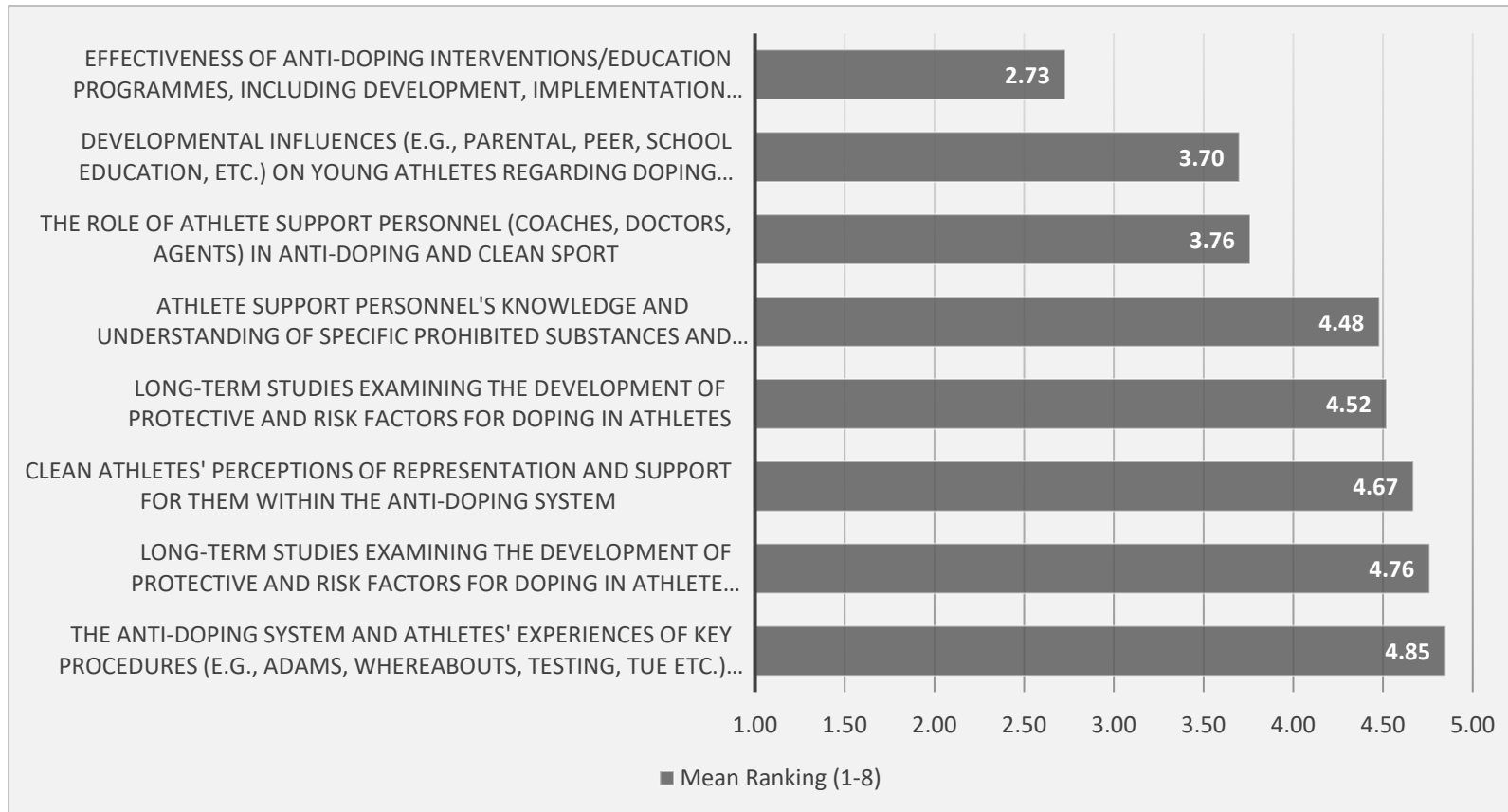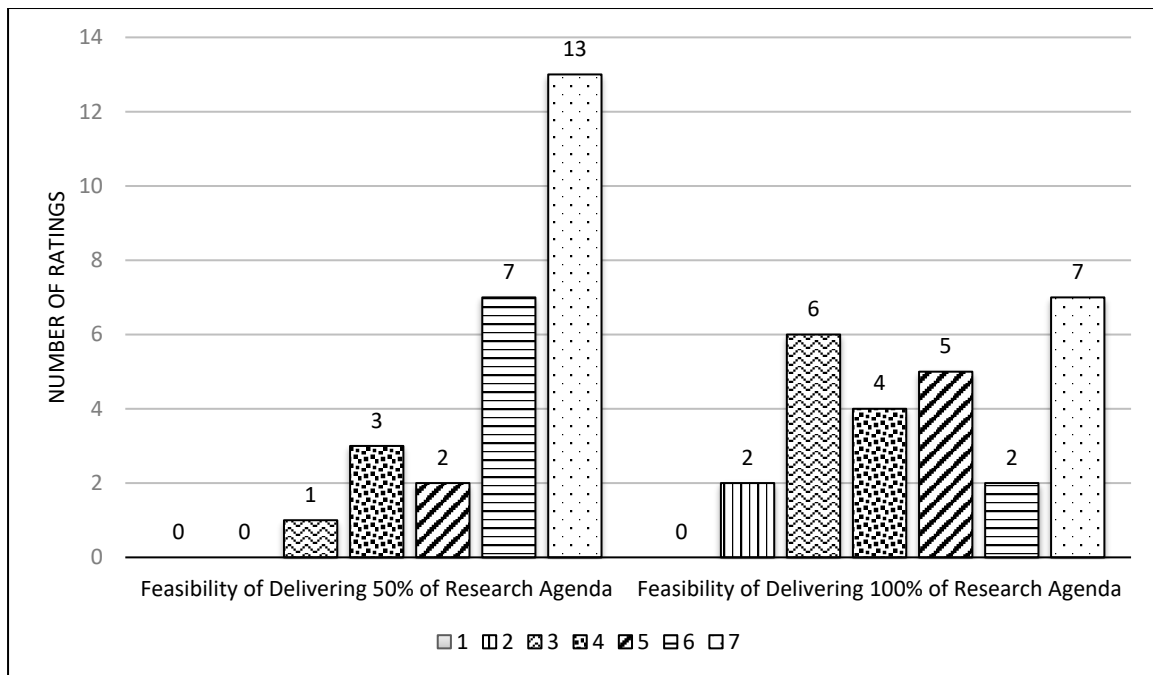
Figure 3. Ratings of Research Agenda Delivery Feasibility

Note. Ratings were provided on a scale of 1 (*Completely Unfeasible*) to 7 (*Completely Feasible*)