An Intervention to Assist Coaches to Optimise Coach Motivational Climates and Prevent Athletes' Willingness to Dope in Sport: A Cross-Cultural Project

Final Report to the

International Olympic Committee

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Executive Summary

The overarching objective of this project was to bring together various strands of internationally acknowledged expertise on motivation and doping to develop a training package for coaches, which would enable them to use a motivationally-supportive style when communicating with their athletes, particularly in relation to anti-doping matters. To this end, we developed a multi-component education program, which we called CoachMADE.

During Phase 1, we customized an existing theory- and evidence-based motivation intervention program for anti-doping education and we developed, for comparison purposes, a "standard" anti-doping information program with no reference to motivational issues. In this phase, we also determined the intervention tools to be used (i.e., questionnaires, role play scenarios, and workshop evaluation forms) for Phase 2. During Phase 2, we tested the effectiveness of the program in Australia, the UK and Greece by examining its effects on a number of coach and athlete-related outcomes. In Phase 3 we analysed all quantitative data and undertook a process evaluation of the trial. Dissemination activities with local stakeholders, media, conference presentations and peer reviewed publications are currently being developed. The protocol paper from this trial has already been published and is freely available to download from https://www.frontiersin.org/articles/10.3389/fpsyg.2017.02301/full

A total of 132 coaches (100 males, 30 females, 2 missing; 39.84 ± 11.83 years of age) were recruited, of whom 104 completed all three assessments. In total, 1107 athletes (628 males, 445 females) from 130 teams/squads completed assessments at pre-intervention ($N_{England}$ = 309, $N_{Australia}$ = 396, N_{Greece} = 402), however a significant number of them did not complete follow-up measures (e.g., attrition was nearly 50% at the last time point in all three countries).

Overall, the results for the effectiveness of the program were mixed. For the quantitative analysis, one major problem which affected the results of our findings was that most variables showed a non-normal distribution with either floor or ceiling effects (e.g., very low willingness to engage in doping or high efficacy to resist doping temptations). This meant that there was no "room" for change in these variables as a result of the intervention. We report here findings that were consistent in both the intention-to-treat and per-protocol analyses.

With regard to the coach data, the change in coaches' self-efficacy to confront athletes regarding doping matters was higher in the experimental group than the control group. Further, the change in coaches' reports of effectiveness of a need supportive interpersonal style was higher in the intervention group than in the control group. In terms of country differences, both the intention to treat and per protocol analyses showed that Greek coaches in the control group reported lower changes per assessment period beyond baseline scores, compared to all coaches, in terms of their efficacy to create an anti-doping atmosphere and prevent inadvertent doping, and use of practices that prevent inadvertent doping. The UK coaches in the control group also reported lower changes per assessment period beyond baseline scores on encouragement of practices to prevent inadvertent doping, compared to the all coaches in the sample. It was not possible to compare whether this rate of change was significantly different between conditions, as a model testing country x condition x time effects did not converge. Years of coaching was positively related to efficacy to confront doping and previous anti-doping education was positively related to encouragement of practices that prevent inadvertent doping at baseline.

With regard to the athlete data, there were no effects of the experimental condition on the change of any of the dependent variables. The intervention group had lower attitudes, higher efficacy and lower moral disengagement scores at baseline, compared to the control group. This difference was consistent across countries, but it was not possible to test whether this difference

remained constant across time. Also, athletes in the UK control group reported lower use of prohibited substances and greater doping knowledge and willingness, compared to the three country averages on these variables. It was not possible to compare whether this rate of change was significantly different between conditions. Another finding that replicated across both analyses was that hours of training were associated with willingness to dope at baseline.

The main findings from the process evaluation are that coaches who engaged with CoachMADE received the program as it was intended and perceived it to be a positive experience for them. They reported positive changes in their personal perceptions and behaviours within and beyond their coaching context, as well as in the perceptions and behaviours of those around them (e.g., fellow coaches, athletes). Coaches generally perceived the workshops delivered and the materials used in the CoachMADE program in a positive way. In addition, coaches reported an increase in confidence in their ability and understanding of anti-doping roles and responsibilities. While this evidence points to encouraging support for the CoachMADE program, difficulties faced in recruiting coaches to get involved are important to note. When combined with coaches reporting contextual constraints to engaging in CoachMADE in the project and in the future (e.g., lack of time), it is apparent that intervening to prevent doping in sport amongst the coaching community is not straightforward. Therefore, the findings of the process evaluation will help to guide future development and implementation of CoachMADE.

Note

Ethics approval for this project was granted by Curtin University's Human Research Ethics Committee (HRE2016-0345); reciprocal ethics approval was granted by the other two participating universities. The trial was registered with the Australia and New Zealand Clinical Trials Registry (ANZCTR): ACTRN12616001688471

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- Sports Medicine Australia
- Swimming Western Australia
- West Australian Football Commission
- Surf Life Saving Western Australia
- Football West
- Triathlon Western Australia
- Athletics Western Australia

The UK team would like to thank Swim England, the Rugby Football League, West Riding County Football Association, Leeds City Council, and Yorkshire Sport Foundation who were proactive in endorsing the project. We extend our thanks to Leeds Beckett University Athletics Union, the Rugby Football League, and Swim England for providing their premises to deliver the workshops, and the following sport organisations who promoted the project throughout the recruitment phase:

- British Cycling
- Badminton England
- Basketball England
- British Triathlon
- England Athletics
- England Handball
- England Korfball
- England Netball
- Yorkshire Cricket

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Introduction

Despite past and current anti-doping efforts by many national and international anti-doping agencies, instances of doping in sport continue to capture media headlines worldwide. For example, in August 2015, the Sunday Times alleged that data from 5,000 Track and Field athletes revealed an "extraordinary extent of cheating" (Calvert, Arbuthnott, & Pancevski, 2015). Doping contravenes the fundamental principles of Olympism and the Olympic charter and it can also harm athletes' health (International Olympic Committee, 2014). As such, the "zero tolerance" response to doping allegations by the International Olympic Committee is unsurprising. However, in addition to a strong punitive stance, anti-doping researchers (e.g., Barkoukis, 2015; Barkoukis, Lazuras, Tsorbatzoudis, & Rodafinos, 2013; Whitaker, Long, Petróczi, & Backhouse, 2014) have argued for the merits of a preventative stance by fostering athletes' anti-doping attitudes, diminished willingness to dope, and efficacy to resist doping-related temptations. Hence, our project aimed to develop and test a preventative theory- and evidence-based intervention to reduce athletes' willingness to dope via helping coaches to support athletes' adaptive motivation and increasing coaches' efficacy to discuss anti-doping information with their athletes in a motivationally supportive manner.

The first comprehensive meta-analysis of psycho-social predictors and outcomes of doping in sport by Ntoumanis, Ng, Barkoukis, and Backhouse (2014) revealed two significant gaps in the anti-doping literature, both of which will be addressed via our project. First, the review showed the dearth of field-based intervention studies. An exception are the ATLAS and ATHENA programs which, however, offered a broad educational program which aimed to tackle other behaviors (e.g., drug use, healthy nutrition) in addition to doping (Goldberg et al., 1996; Elliott, Goldberg, Moe, Defrancesco, Durham, and Hix-Small, 2008). These were athlete-centered interventions and were

effective in reducing self-reported use of diet pills and body-shaping substances (e.g., anabolic steroids, and muscle-building supplements). The second research gap identified in the Ntoumanis et al. meta-analysis was that past literature has mainly centered on the role of personal variables (e.g., attitudes, beliefs, perfectionism) in predicting doping intentions and doping use. Research evidence on the role of socio-contextual factors is comparatively scarce and has focused primarily on the role of prevailing social norms in condoning or sanctioning doping behavior. Although this work is important in identifying the influence of prevailing social norms on doping-related variables, it does not capture the specific behaviors of others via which the social context exerts its influence on athletes. From a doping prevention perspective this exclusion is problematic; if researchers are to develop effective prevention programs, they need to be able to identify specific coach behaviors that should be fostered or avoided.

Coach Communication Style

Although there are various influential social agents in sport (e.g., parents, peers, medical personnel, sport scientists), undoubtedly coaches play a crucial role in shaping the psychological experiences and actions of athletes (Bartholomew, Ntoumanis, & Thøgersen-Ntoumani, 2009; Smith et al., 2010). Indeed, conceptual models of doping behavior (e.g., Donahue, Miquelon, Valois, Goulet, Buist, & Vallerand, 2006; Donovan, Egger, Kapernick, & Mendoza, 2002; Johnson, 2012) and empirical evidence (e.g., Bahrke, 2012; Barkoukis, Lazuras, Tsorbatzoudis, & Rodafinos, 2011) acknowledge the important role of the communication style used by coaches in predicting doping-related outcomes. Hence, it is surprising there are no published intervention studies in the doping literature that have trained coaches to promote an anti-doping environment by focusing on the motivational strategies adopted when they communicate with their athletes. Coaches instruct and try to motivate their athletes in ways in which they were coached themselves, or regard as most

effective, or culturally acceptable or indicative of competent and authoritative instruction (Reeve, 2009). However, some of these motivational strategies are problematic and counterproductive.

Researchers in the sport motivation field have used Self-Determination Theory (SDT; Deci & Ryan, 2002), one of the most widely applied theories of motivation, to differentiate between adaptive and maladaptive coach strategies, and to investigate the effects of these strategies on athletes' psychological needs, well-being, and behavior. In SDT research, a broad distinction has been made between need supportive and need thwarting motivational strategies (also called coach behaviors). Need supportive strategies aim to foster athletes' three fundamental psychological needs: autonomy (feeling control over one's own behavior), competence (feeling effective in producing desired outcomes), and relatedness (feeling connected with and accepted by others). Examples of need supportive behaviors include the provision of meaningful choice and rationale, taking others' perspective into account, acknowledging their feelings, and providing feedback on competence that does not control others' actions (Mahoney, Gucciardi, Gordon, & Ntoumanis, 2017; Ntoumanis, Quested, Reeve, & Cheon, 2018). Such behaviors can increase athletes' psychological need satisfaction, well-being, and prosocial behavior (Hodge & Lonsdale, 2011; Mageau & Vallerand, 2003). In contrast, controlling behaviors are evident when coaches act in a coercive, pressuring, and authoritarian way in order to impose a specific and preconceived way of thinking and behaving upon their athletes. Need thwarting social environments can frustrate basic psychological needs and undermine psychological and physical wellness. For example, self-destructive behaviors (e.g., drug abuse) have been documented when individuals' experience hostile social environments which thwart their needs (Deci & Ryan, 2000). Such findings have important implications for anti-doping research, as they highlight the role of social environments in affecting athletes' welfare. However, there is no experimental research that has examined the role of contextual motivational factors (i.e., coaches' need supportive and need thwarting behaviors) in

predicting doping-related outcomes in athletes (e.g., attitudes to doping, willingness to take potentially illegal substances), via affecting athletes' psychological need satisfaction and need frustration.

Coach Communication Style and Athlete Doping

Ntoumanis, Barkoukis, Gucciardi and Chan (2017) utilized a prospective survey design to examine how coach communication style predicted doping-related variables among 166 Greek athletes. The findings indicated that continued self-reported doping use (at the beginning and the end of the sport season) was predicted indirectly and in a negative fashion by perceptions of coach autonomy (i.e., need) support via the moral attitude of "keeping winning in proportion". Intentions to dope were also negatively predicted by need satisfaction via the same moral attitude. In contrast, perceptions of need thwarting coaching were positive indirect predictors of continued doping use via psychological need frustration, moral disengagement in doping (i.e., cognitively restructuring and discounting doping and its consequences), and endorsement of cheating. The authors argued that their findings could serve as a basis for developing anti-doping education programs for coaches with the aim of training them in more need supportive and less need thwarting behaviors. Our project aimed to address this recommendation.

An important question for the potential usefulness of coach education is, do coaches engage in anti-doping education programs? Evidence suggests that coaches are reluctant to do so. Patterson, Duffy and Backhouse (2014) presented evidence indicating low response rates from coaches in the UK and beyond to engage in such programs, due to perceived lack of personal relevance. Such reluctance is in stark contrast with the findings that emerged from the interviews of individuals responsible for anti-doping education in national and international sport and anti-doping organizations. In these interviews, carried out by the same authors (Patterson, Backhouse, & Duffy, 2016), the administrators highlighted the importance of providing anti-doping education for

coaches. In addition to logistical and resource challenges, the administrators identified negative perceptions of 'anti-doping' efforts (e.g., being punitive as opposed to informational) as an additional barrier to recruit coaches. In the same interviews, the administrators identified the need to obtain the 'buy in' from top administrators within a club or sport organization as a means of creating an appropriate 'anti-doping culture' within a club and engaging coaches to anti-doping education. In our project we followed this recommendation by engaging sport administrators and national or regional sport governing bodies.

In another interview study of Australian and Greek coaches, Ntoumanis, Brooke, Barkoukis, and Gucciardi (2015) found that coaches had an aspiration to influence athletes' doping-related decisions, but they lacked the efficacy or were unable to articulate the specific means by which they can facilitate the fight against doping. Besides feeling efficacious to deliver anti-doping education, it is important that coaches are upskilled to communicate such information in need supportive ways, and avoid or minimize a need thwarting interpersonal style. In the motivational literature, there has been a growing interest in delivering SDT-based interventions that aim to facilitate optimal motivational environments via need supportive communication styles among coaches, teachers, health professionals, and employers. A meta-analysis by Su and Reeve (2011) showed that such training programs were effective (weighted effect size d = 0.63).

The effects of such motivational interventions in terms of athlete doping-related attitudes, willingness to dope, and doping behavior have not yet been tested by any research team to date. In our project we assessed a number of outcomes of such an intervention at the athlete level. These outcomes are listed in italics in this and the next paragraph, alongside a brief justification or evidence of their relevance to doping research. Whitaker, Long, Petróczi, and Backhouse's (2014) application of the prototype/willingness model (Gibbons, Gerrard, Blanton, & Russell, 1998) for doping use in sport showed that *willingness to dope* was predicted by, amongst other things, *past*

doping behavior and *pro-doping attitudes*. Similar findings with regard to the predictive role of the latter two variables were also reported by Barkoukis et al. (2013). In addition, Barkoukis and his colleagues found that *the efficacy to resist the doping-related temptations* was an important predictor of doping intentions and self-reported doping use. Further, as mentioned above, *moral disengagement in doping* has been identified as another strong predictor of doping intentions and doping use (Ntoumanis et al., 2017).

Decisions to engage in doping are not always intentional. At times, athletes may risk the chance of inadvertent doping by taking an unknown substance, especially when they lack or have limited *anti-doping knowledge*. Morente-Sanchez and Zabala's (2013) review identified that athletes lack anti-doping knowledge, particularly around dietary supplements and the possible side effects of performance enhancing drugs. Increasing such knowledge is one way to reduce both intentional and inadvertent doping use. In the same review, it was concluded that coaches were the main influence and source of information for athletes regarding anti-doping. Therefore, in addition to directly targeting athletes via educational programs and resources, improving coaches' anti-doping education can also have indirect benefits in terms of athletes' anti-doping knowledge. Yet Chan et al. (2016) also identified the importance of athletes improving their self-monitoring behaviors in order to avoid inadvertent doping. Hence, in this project we measured the number of *behaviors that athletes will adopt to prevent inadvertent doping* (e.g., checking medications for banned substances prior to use).

Besides collecting data from athletes, this project was also the first intervention study in the anti-doping literature that collected data from coaches. We assessed coaches' *use of need supportive and need thwarting communication style* when discussing doping related issues, as well as their *efficacy to discuss doping with athletes* and *create an anti-doping culture* within their team. Previous work on doping has used the term confrontation efficacy to refer to the efficacy of

coaches to confront athletes about doping (Sullivan, Feltz, LaForge-MacKenzie, & Hwang, 2015). However, we believe the term 'confrontation' is in contrast with the principles of motivational training in our project, hence, we focused on situations in which the coach communicates and discusses doping with their athletes. To take this approach one step further, we asked coaches to rate their efficacy of initiating such discussions as well as the *perceived effectiveness of need supportive vs need thwarting style in dealing with a doping-related situation.* Similar to the athlete sample and for the same reasons as those given above, we also assessed *coaches' knowledge about anti-doping testing procedures* and *encouragement of their athletes to engage in inadvertent doping prevention behaviors.* Lastly, and again similar to the athlete sample, we measured coaches' *anti-doping attitudes* and *moral disengagement in doping*. A study by Psouni, Zourbanos and Theodorakis (2015) found that coaches' intentions to encourage doping use amongst their athletes were strongly predicted by coaches' pro-doping attitudes. Although there are no studies assessing coaches' moral disengagement in doping, we suspected that this variable might also be linked to similar coach intentions.

Objectives

The overarching aim of this project was to contrast the relative effects of an SDT-informed 'motivation and anti-doping' intervention program against a standard (i.e., information-based, increasing awareness) anti-doping control program. The intervention program focused on developing need supportive communication strategies that coaches could apply when interacting with their athletes in general and specifically with regard to doping-related issues (e.g., checking for banned substances in medications). The standard anti-doping information program included up-to-date information on various anti-doping issues (e.g., World Anti-Doping Agency's Prohibited List, testing procedures, risk minimization process for using nutritional supplements), but excluded any motivation-related content.

We also aimed to implement a process evaluation of the intervention via coach interviews, athlete interviews, coach questionnaires on ease and usefulness of the training material, as well as coach fidelity to the intervention material.

Hypotheses

- Compared to their baseline levels and to coaches in the control condition, coaches who complete the intervention would 1) utilize more need supportive and less need thwarting communication strategies when discussing doping related issues with their athletes, 2) report higher efficacy to discuss doping with athletes and create an anti-doping atmosphere within the team, 3) rate need supportive communication styles as being more effective (need thwarting style as less effective) in dealing with a doping-related situations, 4) have better knowledge about anti-doping testing procedures, 5) encourage their athletes to use more inadvertent doping prevention behaviors, 6) report stronger anti-doping attitudes, and 7) report lower moral disengagement in doping.
- Compared to their baseline levels and to athletes in the control condition, athletes whose coaches complete the training would report: 1) less willingness to take potentially illegal substances (primary outcome), 2) higher perceptions of need supportive and lower perceptions of need thwarting coach motivational strategies (our manipulation check), 3) less favorable attitudes, 4) lower moral disengagement toward doping, 5) higher efficacy to resist doping-related temptations, 6) increased knowledge about anti-doping procedures, and 7) more behaviors to prevent unintentional/inadvertent doping. We also measured self-reported use of performance/recreational substances and drugs, but given that previous studies have found that only 10% of athletes admit to doping use (e.g., Barkoukis et al., 2013; Ntoumanis et al., 2017), we did not expect to have statistical power to detect significant changes in such use.

- The intervention effects on doping-related variables would be mediated via increased psychological need satisfaction/reduced need frustration in the athletes in the experimental condition.
- There was insufficient prior evidence to put forward hypotheses regarding any cross-cultural differences in the effectiveness of the intervention.

Methods

Phase 1

During Phase 1, we customized content from an existing theory- and evidence-based motivation intervention program to generate doping-specific content for the intervention condition. For comparison purposes, we also developed a "standard" anti-doping information program with no reference to motivational issues. All materials were translated in Greek and then translation was checked by the first and fourth authors who are fluent in English and Greek; minor modifications were made, where necessary, in the wording. In this phase we also determined the assessment tools (i.e., questionnaires, role play scenarios, and workshop evaluation forms) to be used for Phase 2.

Content Design

In total, three workshops were designed for the project. The intervention package comprised of two 3-hour workshops, whereas the control condition was one, 1-hour workshop.

Control Workshop

The control workshop was designed by the UK-based team using traditional anti-doping information disseminated by National Anti-Doping Organizations (NADO) (e.g., UK Anti-Doping; Australian Sport Anti-Doping Agency) and the World Anti-Doping Agency (WADA). A new workshop was designed because current national anti-doping education programs in the three countries are different in

content and duration, hence, lacking the homogeneity needed for a 'control' comparison. Typically, anti-doping education involves the provision of information about anti-doping rules and regulations to ensure compliance and prevent an anti-doping rule violation. Topics that tend to be covered include the anti-doping rule violations, the prohibited substances list, therapeutic use exemptions, testing procedures, and checking the contents of supplements and medications. Often workshops of this kind occur as a one-off education session for coaches and athletes, typically lasting 60 minutes.

The content provided in the control workshop has been designed to be consistent with these practices and also to be consistent across the three countries. However, in places, presentation slides were adapted so they were relevant to each country. For example, each country was directed to their own National Anti-Doping Organization (NADO) to obtain further information (e.g., Australian Sports Anti-Doping Authority; https://www.asada.gov.au/). In addition, one of the tools to check medications was unavailable in Greece. This tool is a website known as Global Drug Reference Online (DRO). Global DRO does not currently cater for checking medications available in Greece, therefore participants in Greece were directed to the WADA Prohibited List and to the Gallinos website which provides advice on pharmaceutical products (https://www.galinos.gr/).

Experimental Workshops

Workshop 1- Motivation.

Workshop 1 was designed by the Australian-based team. The focus of the first workshop was to provide education for coaches on how to implement a need supportive communication style with their athletes. Our aim was to help coaches understand how to build need supportive communication language in their general coaching, before trying to apply this skill to anti-doping discussions. This workshop and all associated resources were an adaption of an existing motivational workshop which has been previously delivered to fitness instructors in another trial

(Hancox, Quested, Thøgersen-Ntoumani, & Ntoumanis, 2015; Ntoumanis, Thøgersen-Ntoumani, Quested, & Hancox, 2017).

The first workshop aimed to achieve the following:

- Expand coaches' understanding of motivation.
- Explore how/why subtleties in communication styles can be critical in supporting or undermining athletes' motivation.
- Enhance coaches' communication skills by applying motivational strategies based on contemporary research drawing primarily from SDT.
- Support coaches in practical ways (e.g., via brainstorming, role playing) to put into practice some of the taught material.
- Prepare coaches to implement a weekly program of motivation-related communication strategies and activities that they can apply to practice the skills learnt in the workshop over the next four weeks.

Workshop 2- Motivation and anti-doping.

Workshop 2 was designed by the Australian and UK teams. At the beginning of the second workshop, successes and pitfalls in implementing the taught material from the first workshop are discussed. In addition, reflective diaries were reviewed, and further advice is offered as coaches problem solve together to overcome obstacles in implementation. Following this activity, the main aims of Workshop 2 were to:

- Increase coaches' knowledge of anti-doping rules and regulations and raise their awareness of the tools available to reduce the risk of inadvertent doping.

- Upskill coaches in how to apply need supportive communication, drawing from motivational principles outlined in Workshop 1, to reduce athletes' willingness to dope and risk of inadvertent doping.

The material of Workshop 2 was specific to doping in terms of showing how motivational strategies can support or undermine doping-related variables at the athlete level. For example, coaches were trained to become more aware of how psychologically controlling tactics and pressuring techniques that focus on success at any costs can push athletes to use prohibited substances in an effort to appease their coach and gain their approval. It was also discussed how need thwarting coach environments can make athletes more susceptible to inadvertent doping because of increased adeptness at taking risks to gain coach approval. In contrast, it was shown how fostering athletes' initiative, acknowledging their negative emotions, and offering unconditional support can prevent the development of contingencies in the athlete-coach relationship. Hence, under such circumstances athletes are less likely to resort to doping use as means of validating their self-worth and proving themselves to their coach, and are less susceptible to inadvertent doping. Such adaptive and maladaptive motivational strategies, and many other similar examples, were incorporated into our coach education program to help coaches self-reflect on their own motivational strategies and critically appraise how they influence their athletes' willingness to take potentially illegal substances.

The training material helped coaches share existing anti-doping resources and communicate about doping with their athletes in a more need supportive manner and less need thwarting manner, using some of the aforementioned strategies. For example, emphasis was placed on providing rationales, acknowledging anxieties or uncertainties, being responsive to questions, taking time to listen to athletes' opinions, and avoiding personal attacks, imposed goals, or intimidating tactics (see Ntoumanis et al., 2018). Given the influential role of peers on doping-

decision making aspects (e.g., Woolf, Rimal, & Sripad, 2014), coaches were trained to instigate such discussions both individually and in groups of athletes, so that athletes can also be educated as to how their communications and interactions with fellow athletes can influence doping-related outcomes.

Both experimental workshops used an interactive approach where coaches are encouraged to ask questions and discuss content amongst fellow participants and with the presenters. There were a number of activities included in the design of the experimental workshops which invite participants to actively participate. For instance, coaches were invited to write down on sticky notes what they might perceive to be some of the reasons athletes might want to be 'clean', that is not use prohibited substances. They were then provided with an A3 laminated 'motivation barometer' (see Figure 1) and asked to place the sticky note in a position on the barometer that best suits the identified reasons. Other activities involved discussions of videos, role playing of a hypothetical coach-athlete interaction, and group activities which aim to apply theoretical principles to specific sport situations (e.g., discuss the application of need supportive strategies in situations where a coach is approached by an athlete who wants to use nutritional supplements to speed up their strength recovery from an injury).

Figure 1. Motivation barometer.

Additional Content and Resources

Additional resources were developed to complement the workshops in each condition and to improve participant adherence.

Control condition.

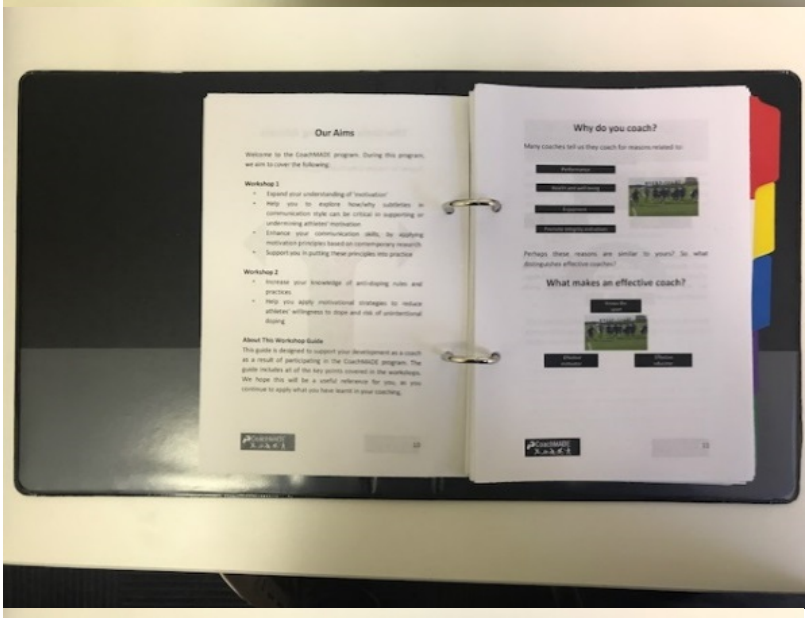
A list of websites was available on the final slide of the workshop and an A4 hard copy of the list was distributed to participants. The list signposted the WADA website, the relevant NADO website, how to check for banned substances in medication, and the process of reducing the risk of inadvertent doping through supplement use. In addition, coaches were provided with information on how they could report any suspicions of doping to the relevant authorities. A hard copy of the slides was also provided to coaches.

Experimental condition.

The coaches in this condition received the same information as those in the control condition. In addition, A5 workbooks were provided which included (see Figure 2):

- Content from the presentation slides with questions to check understanding and summaries of main points.
- Descriptions of the practical activities run in the workshops.
- A personal action plan for coaches to implement the motivational strategies taught in the workshops. We created action and coping planning sheets for coaches to think through how/when strategies might be used, what challenges they might face in doing so, and how these challenges can be overcome.
- Instructions on a week-by-week basis regarding the practicalities of implementing motivational strategies when communicating with athletes. Detailed descriptions are given on how to implement these strategies before, during, or after training. Coaches can keep a

reflective diary of success and failures in implementing in their coaching sessions what they have learned at the workshops.



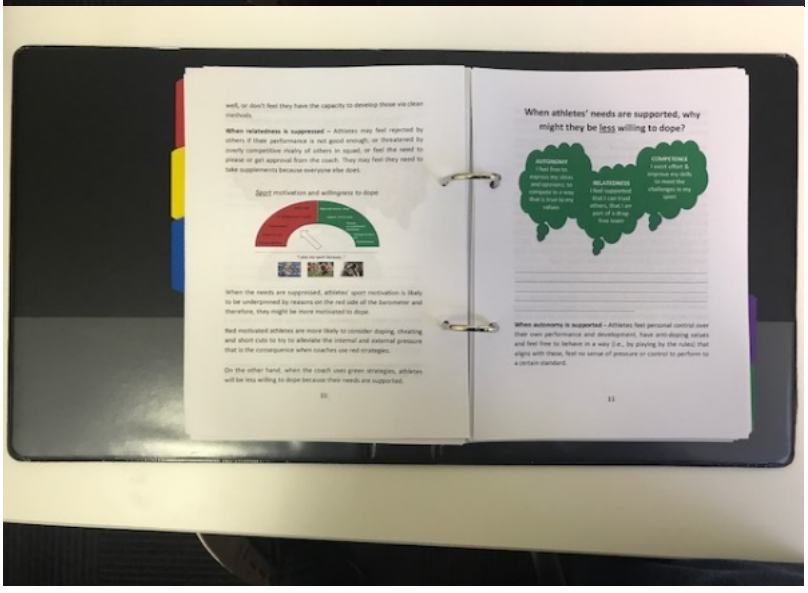


Figure 2. Workbook examples

The workbooks were designed to be portable to allow coaches to carry them during training sessions and to take notes. The coaches were encouraged to utilize the workbooks throughout the program.

The project teams also created restricted access Facebook groups for participating coaches in the experimental condition in each country. The Facebook groups provided coaches with the opportunity to engage in discussions with the project team and interact with fellow coaches participating in the program. For coaches not on Facebook, they received a weekly email communication from the project team. The team provided weekly prompts via Facebook or email to remind coaches to continue to implement the strategies taught during the workshops, as outlined in their workbooks. In addition, the groups were used to disseminate topical information, including research publications, news articles, and videos illustrating different motivational strategies/communication styles by coaches. We have created videos with amateur actors depicting different styles of coach communication. These video clips were designed to assist the coaches to grasp the motivational concepts discussed during the workshops. The coach actors in the video clips reinforced to the athlete actors the importance of providing accurate information about the risks of supplement use. However, different video clips were created (each about 5 minutes long) in which a coach was interacting with an athlete in need supportive, need thwarting, or motivationally neutral ways.

Piloting

Pilot workshops were conducted across all three countries prior to the commencement of phase two. The Australian and UK teams conducted one pilot of each of the experimental workshops. The Greek team conducted one pilot workshop from each condition. Following the workshops, coaches

were invited to provide feedback via evaluation questionnaires. All scales had a response range from 1 ('strongly disagree') to 7 ('strongly agree'). We decided to use pilot workshops instead of conducting individual coach interviews in Phase 1 (as originally suggested in the research proposal) because the group format was consistent with the format used in the main trial, which allowed coaches to provide comments on the general workshop approach/delivery in addition to the specific interactive activities and material that we prepared.

Summary statistics from these evaluations are provided in the Appendix 1. These tables list the number of coaches who answered each question, as well as the minimum, maximum, mean and standard deviation for each question. In addition, the evaluation questionnaires allowed for coaches to comment on their perception of the usefulness of the project. Overall, the responses from the questionnaires and the open-ended questions were very positive. Following these workshops, minor changes were made (e.g. changing the order of the slides, citing additional resources). Feedback was also sought from key stakeholders such as individuals working within national anti-doping agencies, to ensure the workshops were fit for purpose.

Phase 2

In this phase, we designed and delivered a cluster randomized control trial in Australia, UK, and Greece. This study was a parallel group, two-condition, superiority trial. Due to calendar differences in the start of sport seasons, the intervention started half a year earlier in Australia than in the other two countries. In Australia the intervention started in March 2017 and was a continuous process. The last data collection took place in December 2017. In the UK, the intervention took place between August 2017 and September 2018. In Greece the intervention was implemented between November 2017 and July 2018.

Participants and Recruitment

We initially aimed to recruit from sport clubs 20 full-time or part-time coaches in each condition from each country, giving a total sample size of 120 coaches and estimated 1200 athletes. Power estimates were calculated with the Optimal Design Software (Spybrook, Bloom, Congdon, Hill, Martinez, & Raudenbush, 2011) for clustered RCTs with treatment at level 2, primary outcomes at level 1, estimated average number of athletes per coach to be 10, intraclass correlation coefficient of .005, small effect size □□=.22) for willing to engage in doping, and oversampling by about 30% to counter possible missing values and coach/athlete dropout from the study. There were no exclusion criteria for coaches based on their own demographic or coach history characteristics. Inclusion criteria included having a minimum of 6 athletes who are 14 years or older, trained at least once a week, and compete on a regular basis. No more than six coaches were to be recruited from any given club, and coaches within that club were allocated to the same condition. We used a staggered recruitment design. We aimed to recruit from a variety of sports in all three countries, and from both male and female coach and athlete samples.

The research team contacted coaches to determine their eligibility and, if eligible, sought their written consent. Research assistants (trained by the research team) then distributed, at least two weeks prior to the initial data collection, consent/assent forms to athletes. Parental consent forms were also distributed asking parents of athletes between the ages of 14 to 16 years to complete an opt-out form, if necessary. It was made clear to all participants that they are free to withdraw from the project at any point without providing a reason. In general, the ethical guidelines of the American Psychological Association for research with human participants (section 8 of http://www.apa.org/ethics/code/index.aspx) were followed.

Clubs were assigned randomly to either a control or intervention condition with a 1:1 allocation using permuted blocks of random sizes. The block sizes will not be disclosed to ensure

concealment. A researcher carried out randomization (and allocated clubs to the two arms) via a computer software following recruitment. Allocation concealment was ensured, as randomization was not disclosed until after the intervention started. All research assistants were blinded to condition allocation. There were no circumstances in which unblinding for those individuals was necessary. Due to the nature of the intervention, participants could not be blinded to allocation, but they were strongly encouraged not to discuss the content of their training with coaches from other sport clubs until after the end of the program.

Recruitment was carried out by the research team who liaised with sport governing bodies, coach organizations, and sport clubs in and around Perth (Australia), Thessaloniki (Greece), and Leeds (UK). Forms of recruitment included face-to-face contact (e.g., meetings with club president or providing an information session to coaches), flyers, information delivered via email, and promotion via social media (e.g. Twitter) with links to the project's website.

The project teams created Facebook groups, Twitter accounts (@CoachMADE_AUS and @CoachMADE_UK) and a website for participating coaches in the experimental condition (see Figure 3). The Facebook groups provided coaches with the opportunity to engage in discussions with the project team and interact with fellow coaches participating in the program. The project team provided weekly prompts to remind coaches to continue to implement the strategies taught during the workshops, as outlined in their workbooks. In addition, the groups were used to disseminate topical information, including research publications, news articles, and videos illustrating different motivational strategies/communication styles by coaches.

The Twitter accounts provided coaches with links to current information about doping including news articles and new research outputs. Please visit https://twitter.com/coachMADE_AUS?lang=en and https://twitter.com/CoachmadeUK .

The website was used primarily as a recruitment tool and it was advertised during the recruitment process. The website provides comprehensive information about the project and invites interested parties to sign up or contact the research team. Please visit www.coachMADE.com

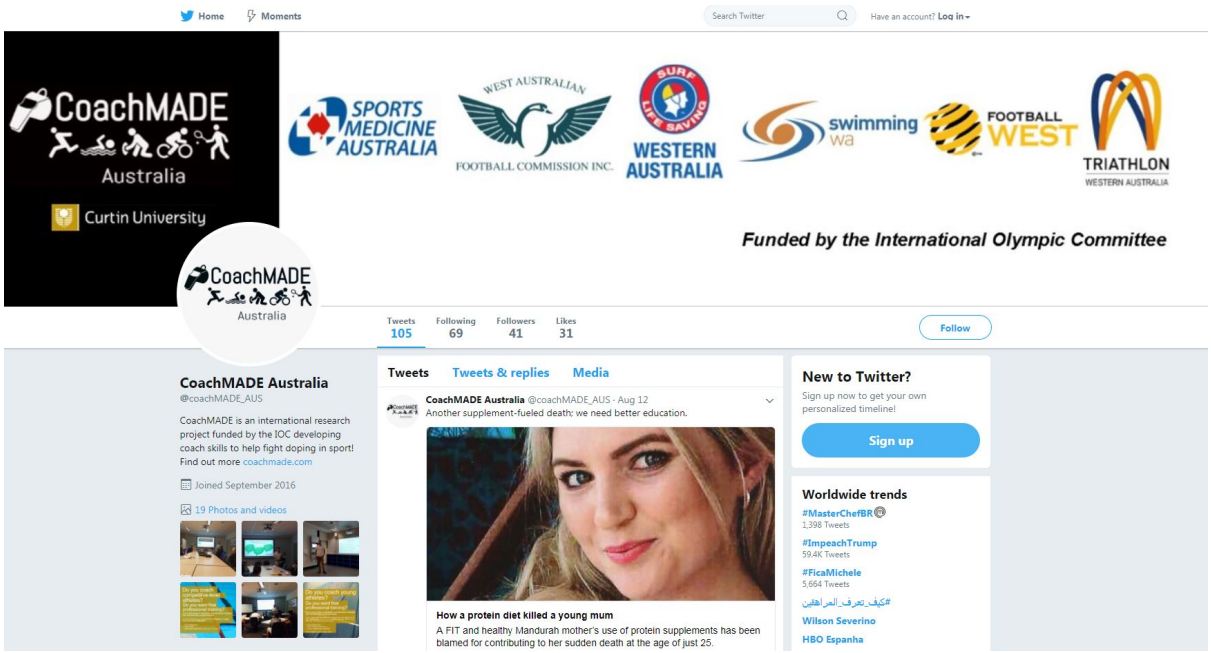


Figure 3. Facebook, Twitter, and website main pages

Procedure

Figure 4 demonstrates an overview of the process involved for coach participation for each condition. The figure outlines the time points at which coaches and their athletes were asked to complete the questionnaires and when they are required to attend the workshop(s). The intervention period started at week 1 and ended 12 weeks later, within each recruited cohort.

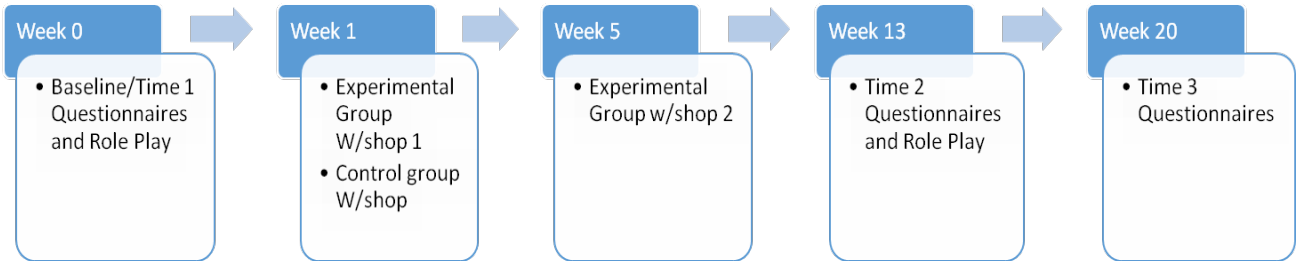


Figure 4. Project timeline

Coaches and athletes in each condition provided measures prior to week 1. Then, coaches in the intervention condition received the first workshop in week 1 and the second workshop in week 5. Coaches in the control condition received their workshop in week 1. Coaches in the intervention condition were given weekly tasks each week up to week 12. The weekly tasks in the first four

weeks focused on planning activities that aimed to increase the use of need supportive communication and avoid or minimize the use of need thwarting behaviors when coaches are interacting with their athletes. The weekly tasks in weeks 5-12 focused on planning activities that aim to help coaches to initiate discussions about doping issues using a need supportive communication style. Coaches were assisted in these weekly activities via a number of resources available in their workbooks and via the private Facebook group. Coaches and athletes in both arms provided assessments after the intervention, that is, in week 13, as well as 2 months later. The coaches in the control condition received the motivational workshop (and all associated resources) after all assessments were completed. However, due to resource constraints, they did not have the ongoing support from us should they have wished to put in practice what they had learned.

To promote participant retention, athletes were entered into a prize draw to win monetary retail vouchers if they completed all assessments. In order to promote retention of coaches in the trial, the research team was in regular contact with them throughout the intervention period via phone and email. No other data was collected from athletes or coaches if they refused to continue participation in the study. All coaches received a certificate from the research team and a monetary retail voucher if they completed all aspects of the project.

The workshops (Figure 5) were delivered by our research team members who have expertise in psychology and experience in delivering workshops about motivation or anti-doping to coaches and athletes. To standardize the delivery of the workshops across countries, presenters at the workshops were trained using video recorded demonstration workshops and detailed slide notes. The workshops took place in a prearranged central location with access to suitable teaching facilities (i.e. close seating arrangements, projector). These locations included university campuses, local sport and recreation departments, or at participating sporting clubs or organizations.

Figure 5. The photo illustrates a typical size workshop in Perth.

Measures

Questionnaires.

Two questionnaire packs (one for coaches and one for athletes) with the same questions were administered at all three time-points (with the exception of questions about demographics which were administered at baseline). Participants were matched up across time points by a unique ID code given to them by the research team. The questionnaire packs included new questionnaires developed by us for the purposes of this project as well as questionnaires that are already available in the literature; we refer the reader to the original sources for information on the psychometric properties of established questionnaires.

Athlete questionnaire pack (see Appendix 2).

1. Willingness to take banned substances (Whitaker, Long, Petróczi, & Backhouse, 2014). It consists of nine items, scored on a 1 (*not at all willing*) to 7 (*extremely willing*) scale. The stem is "Would you be willing to use a banned substance if you…": An example item is: "Have been heavily underperforming?"

2. Moral disengagement in doping (Kavussanu, Hatzigeorgiadis, Elbe, & Ring, 2016). It consists of six items, scored on a 1 (*strongly disagree*) to 7 (*strongly agree*) scale. An example item is: "Doping is alright because it helps your team".
3. Attitudes toward doping (Barkoukis, et al., 2013). It consists of eight items, scored on a 1 to 7 scale with opposite adjectives. The stem is "How do you feel about doping?". An example item is: "Harmful" (scored as 1) and "Beneficial" (7).
4. Efficacy to resist doping-related temptations (Barkoukis, et al., 2013). It consists of six items, scored on a 1 (*no confidence*) to 7 (*complete confidence*) scale. The stem is "How confident would you be that you could resist the temptation to use banned substances even if…?". An example item is: "Your teammates or other competitors were using these substances?".
5. Self-reported use of performance/recreational substances and drugs. This variable is assessed with a new measure developed by the research team. We list 13 groups of substances and products, some permitted (e.g., creatine) and some prohibited (e.g., anabolic steroids), and ask athletes whether they have used any of those in the last 12 months (in the first assessment) or since last completing the questionnaire (in the next two assessments).
6. Knowledge about anti-doping testing procedures. This variable is assessed with a new measure developed by the research team and based on current NADO knowledge assessment approaches. It is presented in the form of a quiz with six questions with three possible answers (*True, False, I Don't Know*). An example is: "If a nutritional supplement is bought from the pharmacy (over-the-counter), it will not contain a banned substance".
7. Behaviors to prevent unintentional/inadvertent doping. This variable is assessed with a new measure developed by the research team. We list six behaviors and we ask athletes to indicate with a *Yes* or *No* answer whether they have engaged in this behavior in the last 4

weeks. An example is: “Checked if my supplements, food and/or drinks contain banned substances”.

8. Perceived need supportive and need thwarting coach behaviors (Interpersonal Behaviors Questionnaire (IBQ) in Sport; Rocchi, Pelletier & Desmarais, 2017). It consists of 24 items, scored on a 1 (*strongly disagree*) to 7 (*strongly agree*) scale. The stem is “Over the last 4 weeks, my coach…”. An example item for need support is: “Supported my decisions” and for need thwarting is: “Imposed their opinions on me”.
9. Satisfaction (Bartholomew, Ntoumanis, Ryan, Bosch, & Thogersen-Ntøumani, 2011) and frustration of psychological needs (Bartholomew, Ntoumanis, Ryan, Thogersen-Ntøumani, 2011). Fifteen items measured the satisfaction of the three psychological needs and 12 items measured the frustration of those needs. All items were scored on a 1 (*strongly disagree*) to 7 (*strongly agree*) scale. An example item for need satisfaction is: “I have a say regarding what skills I want to practice” and for need frustration is: “I feel forced to follow training decisions made for me”.

Coach questionnaire pack (see Appendix 2).

1. Moral disengagement (moral disengagement in doping scale, Kavussanu et al. 2016). See athlete questionnaire pack.
2. Attitudes toward doping (Barkoukis et al. 2013). See athlete questionnaire pack.
3. Efficacy to discuss with athletes about doping (Doping Confrontation Efficacy Scale, Sullivan et al., 2015). This variable is a 20-item scale, but we are using seven items only as the rest of the questions mix discussions about doping and communication style used in such discussions (e.g., “how confident are you in your ability to confront athletes about PEDs while avoiding personal criticism”?). Unlike Sullivan et al. who used a 1-7 scale, we used a 0% (*no confidence*) to 100% (*complete confidence*) scale, as such a scale is more common in

the self-efficacy literature (Bandura, 1997). An example item from those we are using is: "How confident are you in your ability to discuss banned substances and methods with an athlete"?.

4. Perceived effectiveness of need supportive and need thwarting communication styles in dealing with a situation in which a coach suspects an athlete in their team has used a banned substance. This variable is assessed with a new measure developed by the research team. We developed 10 items, five for a need supportive style and five for a need thwarting style; these items are scored on a 1 (*very ineffective*) to 7 (*very effective*) scale. An example item of the former style is: "Demonstrating affection and care", and of the latter is: "Impose rules with no explanations".
5. Efficacy to create anti-doping atmosphere within the team. This variable is assessed with a new measure developed by the research team. We wrote four items which are scored on a 0% (*no confidence*) to 100% (*complete confidence*) scale. An example is: "How confident are you to create a culture within your athletes in which doping is not valued?"
6. Knowledge about anti-doping testing procedures. See athlete questionnaire pack.
7. Encouragement of athletes to engage in behaviors to prevent unintentional/inadvertent doping. This variable is similar to the 'behaviors to prevent unintentional/inadvertent doping' questionnaire in the athlete pack, but it has been modified to ask coaches whether they have encouraged their athletes to engage in those behaviors.

Fidelity assessment.

Coaches were also asked to participate in a semi-structured role play. During the role play, a trained research assistant played the role of an athlete considering taking banned substances while the coach responds in ways which they would consider as a typical response from them. In this hypothetical scenario, a 23-year old athlete has experienced a performance 'plateau' in that they

had not seen their performance improve over the last 12 months. They were considering taking performance enhancing supplements to break this trend. The role play typically lasted about 20 minutes and took place on two occasions, before the intervention and after the end of it. The role plays were audio recorded so that they could be coded later on in terms of the communication style used by the coach. The aim of this assessment was to establish whether the intervention arm coaches' communication during the second role play demonstrates fidelity to the intervention (i.e., "treatment enactment"; see Borrelli, 2011), and also to compare the ratings of the coaches in the two arms at each time point. A more rigorous test would have been to code actual communications between coaches and their athletes, however, this was not feasible due to resource constraints as well as the logistical and ethical challenges of filming such discussions. Our role playing was, hence, a proxy measure of fidelity to treatment enactment. We have followed many of Borrelli's recommendations to enhance fidelity throughout the research process including study design (e.g., explicit use of a theoretical model, pilot testing and feedback from participants), training (standardized training, accommodate learner differences, assess skill acquisition, prevent skills drift), treatment delivery (interviews at the end of the project, use of a manual), and treatment receipt (e.g., present material in an engaging way, assess confidence to apply the skills delivered). Fidelity recordings have not been analysed yet but we hope to publish a paper reporting their analysis in the future.

Data Management

All hardcopy data were stored in locked filing cabinets at the participating universities. A document linking participants' IDs (necessary to match up coach and athlete data at different time points) with participants' names will be kept securely on a password-protected computer and stored on University secure servers. All data will be kept securely for the number of years stipulated at each participating university (e.g., seven years at Curtin University), after which they will be destroyed.

Results

Quantitative Analyses

Data Analyses

We tested changes in the dependent variables in the athlete questionnaire within a multilevel framework using M*plus* 8.1 (Muthén & Muthén, 2017), to account for the nested nature of the data (for a technical overview of 3-level multilevel models, see Peugh & Heck, 2017). For the athlete data, there were 3 levels in the analysis, with repeated measures (Level 1) nested within athletes (Level 2) nested within coaches (Level 3). Analysis of repeated measures at Level 1 provides an understanding of athletes' increase or decrease on each dependent variable over three time points, namely pre-intervention (week 0), post-intervention (week 13), and long-term follow-up (week 21). Time was scored as 0 (pre-intervention), 1 (post-intervention), and 2 (long-term follow-up). At level 2, grand mean centred athlete demographics (gender [0 = female, 1 = male], age, hours per week spent training, and number of years with their current coach) were entered as predictors of the dependent variable; experimental condition (0 = control, 1 = intervention) was entered as a predictor of the random slope of time on the dependent variable; these effects provide an indication of the extent to which changes in athletes' responses on the dependent variables varied as a function of these background characteristics. The effect of the experimental condition on the random slope of time on the dependent variable was of particular interest as it tested whether the change in the dependent variable was lower or higher for the intervention group (i.e., time x experimental condition interaction). We also modelled a random slope to capture the variation of the experimental condition on the dependent variable across individuals. Country effects were added at level 3 to examine differences in the random slopes of the dependent variable on experimental condition and the time by experimental condition interaction from level 2.

We followed the guidelines of Kraemer and Blasey (2004) to create two dummy variables to represent the Greek (GRC = .67, UK/AUS = -.33) or English (UK = .67, GRC/AUS = -.33) athletes as the reference group. With this effect coding, the dummy coefficient represents the difference between the Greek sample (and the English sample) from the average of all three countries on the dependent variable. Due to an administration error, key study variables were excluded from the Greek athlete questionnaire package at post-intervention and longer-term follow-up. These were perceived need support and thwarting coach behaviours, doping attitudes, efficacy to resist doping-related temptations, inadvertent doping preventative behaviours, and knowledge about anti-doping testing procedures. As such, we excluded the Greek data from testing changes in these dependent variables and used a binary dummy variable to contrast country effects (-1 = UK, 1 = AUS).

For coach reported data, there were 2 levels in the analysis, with repeated measures (Level 1) nested within coaches (Level 2). Demographic variables (gender [0 = female, 1 = male], previous doping education [0 = no, 1 = yes], and number of years coaching), experimental condition (0 = control, 1 = intervention), and country effects were entered as predictors of the random slope of time on the dependent variable at level 1. To facilitate model convergence, we used a Bayesian estimator with non-informative priors to ensure the data drove the characterisation of the posterior distribution. The Gibbs sampler was used to treat missing observations as unknown values to be estimated using the algorithm under the missing at random assumption (Asparouhov & Muthén, 2010).

In all analyses, we compared the effects of the intervention when all randomised participants are retained in the analysis (i.e., intention-to-treat; Heritier, Gebski, & Keech, 2003) with responses from those individuals who completed all assessment periods (i.e., per protocol; Sainani, 2010). We also tested a theoretical sequence in which the effects of the intervention on doping-related variables were hypothesised to occur via athletes' perceptions of their coach's

interpersonal style and satisfaction or frustration of basic psychological needs (see Figure 6). Two separate path analyses of this model using observed scores were performed using either post-intervention (week 13) or long-term follow-up (week 21) assessments, controlling for the pre-intervention scores of each study variable. To account for the nested nature of the data (i.e., several athletes from within the same team or squad), we used the TYPE = COMPLEX function in M*plus* to apply a correction to the standard errors (Asparouhov & Muthén, 2006). We also used a robust maximum likelihood estimator (MLR) to accommodate deviations from non-normality. We excluded the Greek data from tests of the hypothesised theoretical sequence due the aforementioned administration error in the survey package. Missing data were handled using full information maximum likelihood estimation. Indirect effects from experimental condition to the doping-related outcomes of use of prohibited substances, inadvertent doping, and doping knowledge were executed using the MODEL INDIRECT function in M*plus* (Preacher & Hayes, 2008).

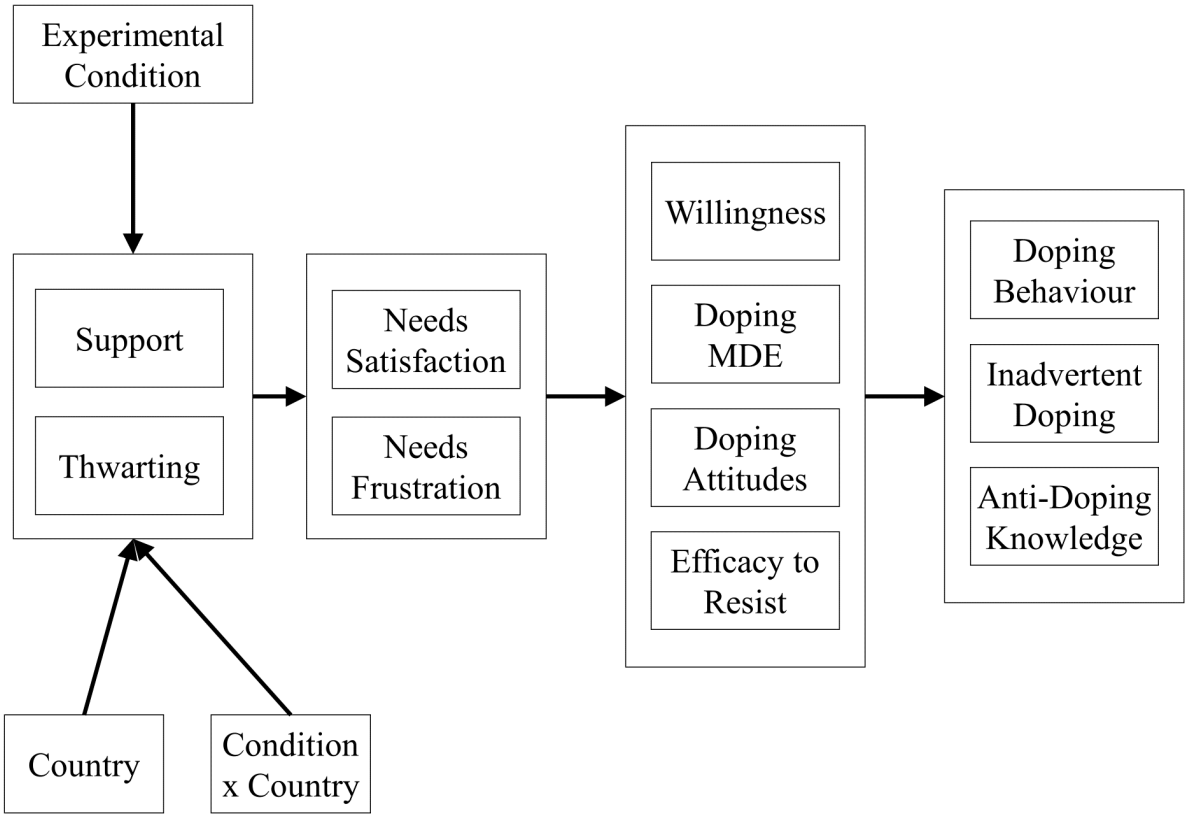


Figure 6. Visual depiction of the hypothesised theoretical sequence via which motivationally enriched training in coach anti-doping education affects doping-related outcomes.

Note: variables encompassed within a single border are correlated; experimental condition = control (0) and intervention (1); country = UK (-1) and Australia (1).

Preliminary Analyses

In total, 1107 athletes (628 males, 445 females, 1 transgender, 33 missing; 20.23 ± 9.26 years of age) from 130 teams/squads completed assessments at pre-intervention ($N_{England}$ = 309, $N_{Australia}$ = 396, N_{Greece} = 402). At pre-intervention, athletes spent an average of 6.30 ± 4.94 hours per week training with their team/squad and had roughly 2.39 ± 2.32 years with their current coach. Of the 1107 athletes who entered the study, 432 completed all three assessments, 412 completed two assessments (either baseline and post-intervention or longer-term follow-up), and 263 completed one assessment (baseline) only. These groups differed on the amount of hours per week spent

training with their team/squad [$F(2, 1069) = 5.98$, $p = .003$], and the number of years with their current coach [$F(2, 1043) = 6.49$, $p = .002$] but not biological age [$F(2, 1049) = .92$, $p = .399$]. Post hoc tests indicated that individuals who completed all three assessments spent more hours per week training with their squad (6.92 $\pm$ 5.70), when compared with athletes who missed one assessment only (5.74 $\pm$ 4.30). In terms of the number of years of the relationship with their coach, athletes who completed all assessments (2.70 $\pm$ 2.51) reported a duration that was higher than individuals who missed one (2.20 $\pm$ 2.15) or both post-baseline assessments (2.15 $\pm$ 2.16). Missing data at the variable level was negligible (< 1%). Table 1 provides information on age, years of sport participation, and gender of the participating athletes across the three countries, per sport and experimental condition.

A total of 132 coaches (100 males, 30 females, 2 missing; 39.84 ± 11.83 years of age) were recruited, who had been involved in coaching sport for 12.91 ± 9.97 years. At pre-intervention, coaches spent an average of 10.16 ± 9.19 hours per week coaching their team/squad, and had roughly 4.16 ± 4.51 years with their current team/squad. Prior to taking part in the study, 49 coaches indicated that they had previously received anti-doping education. Of the 132 coaches who entered the study, 104 completed all three assessments, 21 completed two assessments (either baseline and post-intervention or longer-term follow-up), and seven completed one assessment (baseline) only. There were no differences between these coaches in terms of the amount of hours per week spent coaching their team/squad [$F(2, 125) = 1.66$, $p = .195$], the number of years with their current team/squad [$F(2, 124) = 1.03$, $p = .360$], and biological age [$F(2, 83) = .32$, $p = .731$]. In Table 2 we provide information on coaches' age, years of coaching experience, and gender across the three countries, per sport and experimental condition.

Descriptive statistics and internal reliability coefficients for the athlete data are reported in Table 3 (and Table 4 for the coach data). In brief, most variables showed a non-normal distribution

with either floor or ceiling effects. The internal reliability coefficients were acceptable for all variables at all time points. Athletes who self-reported using one or more banned substance at each time point were 80 at baseline, 46 at post intervention and 39 at the follow-up.

Table 1. Descriptive statistics for age, experience, and gender of athletes participating in the CoachMADE project

Country	Sport		Condition	
			Experimental Group	Control Group
			M (SD)	M (SD)
Australia	Athletics (control *n*=7) (experimental *n*=0)	Age	-	15.34 (3.11)
		Experience	-	1.04 (1.17)
		Gender	-	0 males (7 females)
	Football (control *n*=48) (experimental *n*=23)	Age	16.76 (.67)	20.14 (6.33)
		Experience	1.65 (.48)	1.26 (1.00)
		Gender	23 males (0 females)	0 males (48 females)
	Cricket (control *n*=26) (experimental *n*=0)	Age	-	14.74 (1.17)
		Experience	-	1.32 (.62)
		Gender	-	26 males (0 females)
	Futsal (control *n*=33) (experimental *n*=0)	Age	-	23.56 (7.61)
		Experience	-	2.18 (1.40)
		Gender	-	24 males (9 females)
	Hockey (control *n*=25) (experimental *n*=37)	Age	27.93 (7.36)	22.44 (9.12)
		Experience	2.20 (2.08)	1.10 (.72)
		Gender	30 males (7 females)	17 males 8females)
	Netball (control *n*=9) (experimental *n*=12)	Age	16.84 (1.48)	16.58 (.19)
		Experience	2.75 (1.21)	1.50 (.66)
		Gender	0 males (12 females)	0 males (9 females)
	Rugby (control *n*=9) (experimental *n*=0)	Age	-	24.95 (3.43)

		Experience	-	2.11 (1.53)
		Gender	-	9 males (0 females)
	Soccer (control *n*=48) (experimental *n*=0)	Age	-	16.47 (2.77)
		Experience	-	1.53 (.81)
		Gender	-	42 males (6 females)
	Softball (control *n*=0) (experimental *n*=38)	Age	28.62 (13.23)	-
		Experience	2.44 (2.41)	-
		Gender	0 males (38 females)	-
	Squash (control *n*=0) (experimental *n*=9)	Age	27.92 (10.82)	-
		Experience	2.78 (.97)	-
		Gender	6 males (3 females)	-
	Synchronized swimming (control *n*=14) (experimental *n*=0)	Age	-	16.57 (3.01)
		Experience	-	2.00 (.91)
		Gender	-	0 males (14 females)
	Tennis (control *n*=0) (experimental *n*=46)	Age	16.21 (1.96)	-
		Experience	4.63 (2.38)	-
		Gender	44 males (2 females)	-
	Triathlon (control *n*=12) (experimental *n*=0)	Age	-	16.99 (1.95)
		Experience	-	4.75 (3.76)
		Gender	-	6 males (6 females)
UK	Athletics (control *n*=0) (experimental *n*=18)	Age	31.78 (15.72)	-
		Experience	1.74 (1.07)	-
		Gender	10 males (8 females)	-
	Badminton (control *n*=13) (experimental *n*=0)	Age	-	15.01 (1.12)
		Experience	-	3.73 (2.55)
		Gender	-	11 males (2 females)
	Basketball (control *n*=10) (experimental *n*=0)	Age	-	14.38 (.33)
		Experience	-	.53 (.58)
		Gender	-	10 males (0 females)

Cycling (control *n*=4) (experimental *n*=12)	Age	14.90 (.93)	14.76 (.39)
	Experience	.80 (1.20)	2.75 (2.90)
	Gender	12 males (0 females)	1 males (3 females)
Football (control *n*=16) (experimental *n*=15)	Age	15.60 (1.91)	25.55 (3.08)
	Experience	.44 (1.03)	1.75 (1.38)
	Gender	5 males (10 females)	15 males (1 other)
Hockey (control *n*=0) (experimental *n*=15)	Age	26.80 (10.13)	-
	Experience	1.18 (.69)	-
	Gender	0 males (15 females)	-
Ice skating (control *n*=15) (experimental *n*=0)	Age	-	35.56 (18.28)
	Experience	-	4.29 (3.73)
	Gender	-	1 other (13 females)
Rugby League (control *n*=26) (experimental *n*=31)	Age	14.88 (.57)	17.27 (.79)
	Experience	.76 (1.34)	2.17 (1.23)
	Gender	25 males (0 females)	26 males (0 females)
Rugby Union (control *n*=0) (experimental *n*=19)	Age	23.63 (3.11)	-
	Experience	1.79 (1.45)	-
	Gender	18 males (0 females)	-
Squash (control *n*=4) (experimental *n*=0)	Age	-	20.60 (.41)
	Experience	-	1.53 (1.05)
	Gender	-	3 males (1 females)
Swimming (control *n*=14) (experimental *n*=26)	Age	20.01 (11.84)	14.68 (1.66)
	Experience	3.57 (4.05)	195 (.18)
	Gender	13 males (13 females)	9 males (5 females)
Synchronized swimming (control *n*=0) (experimental *n*=7)	Age	15.56 (.89)	-
	Experience	3.64 (1.74)	-
	Gender	0 males (7 females)	-
Tennis	Age	-	2.011 (1.86)

	(control *n*=15) (experimental *n*=0)			
		Experience	-	1.65 (1.22)
		Gender	-	8 males (5 females)
	Triathlon (control *n*=0) (experimental *n*=49)	Age	41.58 (10.03)	-
		Experience	2.50 (2.72)	-
		Gender	24 males (20 females)	-
Greece	Basketball (control *n*=53) (experimental *n*=45)	Age	17.49 (5.80)	18.98 (6.26)
		Experience	1.75 (1.72)	1.47 (1.61)
		Gender	44 males (0 females)	32 males (16 females)
	Gymnastics (control *n*=0) (experimental *n*=12)	Age	15.14 (1.20)	-
		Experience	4.00 (3.27)	-
		Gender	3 males (8 females)	-
	Handball (control *n*=24) (experimental *n*=10)	Age	21.44 (4.58)	13.64 (.95)
		Experience	1.38 (1.26)	4.03 (2.06)
		Gender	0 males (9 females)	17 males (4 females; 3 other)
	Muai-Thai (control *n*=0) (experimental *n*=14)	Age	29.13 (5.93)	-
		Experience	2.11 (1.90)	-
		Gender	9 males (5 females)	-
	Rowing (control *n*=6) (experimental *n*=8)	Age	33.29 (5.25)	17.13 (1.71)
		Experience	1.83 (1.03)	480 (2.58)
		Gender	6 males (2 females)	3 males (3 females)
	Soccer (control *n*=43) (experimental *n*=0)	Age	-	17.85 (4.63)
		Experience	-	1.23 (1.28)
		Gender	-	40 males (0 females)
	Swimming (control *n*=19) (experimental *n*=16)	Age	15.56 (1.69)	13.10 (1.24)
		Experience	3.60 (1.78)	3.97 (1.80)

	Gender	7 males (9 females)	5 males (14 females)
Tae Kwon Do (control *n*=0) (experimental *n*=31)	Age	16.97 (2.81)	-
	Experience	5.47 (4.44)	-
	Gender	20 males (11 females)	-
Tennis (control *n*=6) (experimental *n*=0)	Age	-	12.30 (1.26)
	Experience	-	3.10 (1.54)
	Gender	-	1 males (5 females)
Athletics (control *n*=26) (experimental *n*=30)	Age	16.61 (3.40)	15.53 (3.37)
	Experience	3.76 (3.76)	2.86 (1.77)
	Gender	10 males (18 females; 1 other)	13 males (12 females)
Volleyball (control *n*=5) (experimental *n*=54)	Age	13.24 (1.14)	13.38 (.63)
	Experience	3.01 (1.78)	2.60 (1.41)
	Gender	0 males (53 females)	0 males (5 females)

Table 2. Descriptive statistics for age, experience, and gender of coaches participating in the CoachMADE project

Country	Sport		Condition	
			Experimental Group	Control Group
			M (SD)	M (SD)
Australia	Athletics (control *n*=1) (experimental *n*=0)	Age	-	51.19 (-)
		Experience	-	20.00 (-)
		Gender	-	1 male (0 females)
	Football (control *n*=2) (experimental *n*=2)	Age	45.79 (1.87)	31.87 (6.90)
		Experience	12.50 (3.53)	10.00 (9.98)

	Gender	2 males (0 females)	1 male (1 female)
Cricket	Age	-	42.00 (3.62)
(control *n*=2)			
(experimental *n*=0)			
	Experience	-	9.00 (1.41)
	Gender	-	2 males (0 females)
Futsal	Age	-	32.94 (6.90)
(control *n*=5)			
(experimental *n*=0)			
	Experience	-	4.40 (4.72)
	Gender	-	4 males (1 female)
Hockey	Age	43.95 (5.89)	38.41 (13.52)
(control *n*=3)			
(experimental *n*=4)			
	Experience	24.33 (5.13)	18.33 (18.33)
	Gender	4 males (0 females)	3 males (0 females)
Netball	Age	49.39 (-)	26.77 (-)
(control *n*=1)			
(experimental *n*=1)			
	Experience	10.00 (-)	4.00 (-)
	Gender	1 male (0 females)	0 males (1 female)
Rugby	Age	-	53.88 (-)
(control *n*=1)			
(experimental *n*=0)			
	Experience	-	12.00 (-)
	Gender	-	1 male (0 females)
Soccer	Age	-	32.85 (15.35)
(control *n*= 5)			
(experimental *n*=0)			
	Experience	-	11.80 (8.01)
	Gender	-	4 males (1 female)
Softball	Age	51.07 (10.35)	-
(control *n*=0)			
(experimental *n*=6)			
	Experience	20.20 (14.09)	-
	Gender	1 male (5 females)	-
Squash	Age	54.04 (-)	-
(control *n*=0)			
(experimental *n*=1)			
	Experience	4.00 (-)	-
	Gender	0 males (1 female)	-
Synchronized swimming	Age	-	23.61 (2.40)
(control *n*=4)			
(experimental *n*=0)			
	Experience	-	5.00 (2.58)
	Gender	-	0 males (4 females)
Tennis	Age	38.91 (14.28)	-

	(control *n*=5) (experimental *n*=0)			
		Experience	15.80 (10.91)	-
		Gender	5 males (0 females)	-
	Triathlon	Age	-	45.72 (-)
	(control n=1) (experimental n=0)			
		Experience	-	20.00 (-)
		Gender	-	1 male (0 females)
UK	Athletics	Age	66.59 (18.65)	-
	(control *n*=0) (experimental *n*=4)			
		Experience	18.00 (17,60)	-
		Gender	4 males (0 females)	-
	Badminton	Age	-	44.37 (26.33)
	(control *n*=2) (experimental *n*=0)			
		Experience	-	16.55 (19.02)
		Gender	-	1 male (1 other)
	Basketball	Age	-	46.58 (-)
	(control *n*=1) (experimental *n*=0)			
		Experience	-	25.00 (-)
		Gender	-	1 male (0 females)
	Cycling	Age	49.80 (2.17)	56.87 (-)
	(control *n*=1) (experimental *n*=2)			
		Experience	4.65 (.49)	10.00 (-)
		Gender	2 males (0 females)	0 males (1 female)
	Football	Age	41.25 (11.58)	26.32 (-)
	(control *n*=1) (experimental *n*=2)			
		Experience	17.50 (3.53)	7.00 (-)
		Gender	2 males (0 females)	1 male (0 females)
	Hockey	Age	49.97 (-)	-
	(control *n*=0) (experimental *n*=1)			
		Experience	12.00 (-)	-
		Gender	1 male (0 females)	-
	Ice skating	Age	-	33.49 (-)
	(control *n*=1) (experimental *n*=0)			
		Experience	-	18.00 (-)
		Gender	-	1 male (0 females)
	Rugby League	Age	38.87 (5.98)	32.32 (7.51)
	(control *n*=6) (experimental *n*=3)			
		Experience	13.17 (5.00)	9.33 (5.50)

		Gender	3 males (0 females)	6 males (0 females)
	Rugby Union (control *n*=0) (experimental *n*=1)	Age	39.19 (-)	-
		Experience	20.00 (-)	-
		Gender	1 male (0 females)	-
	Squash (control *n*=1) (experimental *n*=0)	Age	-	32.07 (-)
		Experience	-	14.00 (-)
		Gender	-	0 males (1 female)
	Swimming (control *n*=5) (experimental *n*=4)	Age	30.23 (12.64)	51.65 (8.98)
		Experience	4.75 (3.77)	22.10 (19.97)
		Gender	4 males (0 females)	4 males (1 female)
	Synchronized swimming (control *n*=0) (experimental *n*=1)	Age	28.26 (-)	-
		Experience	7.00 (-)	-
		Gender	0 males (1 female)	-
	Tennis (control *n*=3) (experimental *n*=0)	Age	-	34.24 (19.76)
		Experience	-	18.00 (19.15)
		Gender	-	2 males (1other)
	Triathlon (control *n*=2) (experimental *n*=5)	Age	46.92 (6.89)	55.82 (11.15)
		Experience	13.60 (11.28)	4.00 (1.41)
		Gender	3 males (2 females)	2 males (0 females)
Greece	Basketball (control *n*=4) (experimental *n*=5)	Age	37.16 (9.85)	42.53 (7.75)
		Experience	11.60 (8.08)	19.00 (10.42)
		Gender	5 males (0 females)	4 males (0 females)
	Gymnastics (control *n*=0) (experimental *n*=2)	Age	35.50 (8.20)	-
		Experience	9.00 (4.24)	-
		Gender	1 male (1 female)	-
	Handball (control *n*=2) (experimental *n*=1)	Age	51.18 (-)	36.70 (11.86)

	Experience	27.00 (-)	12.50 (12.02)
	Gender	1 male (0 females)	2 males (0 females)
Muai-Thai	Age	34.39 (-)	-
(control *n*=0)			
(experimental *n*=1)			
	Experience	13.00 (-)	-
	Gender	1 male (0 females)	-
Rowing	Age	31.77 (-)	43.75 (-)
(control *n*=1)			
(experimental *n*=1)			
	Experience	2.00 (-)	24.00 (-)
	Gender	1 male (0 females)	1 male (0 females)
Soccer	Age	-	38.56 (7.95)
(control *n*=4)			
(experimental *n*=0)			
	Experience	-	9.67 (3.78)
	Gender	-	4 males (0 females)
Swimming	Age	29.05 (3.77)	33.32 (6.65)
(control *n*=3)			
(experimental *n*=2)			
	Experience	10.50 (3.53)	12.50 (2.12)
	Gender	2 males (0 females)	2 males (1 female)
Tae Kwon Do	Age	29.66 (9.79)	-
(control *n*=0)			
(experimental *n*=3)			
	Experience	11.33 (8.08)	-
	Gender	2 males (1 female)	-
Tennis	Age	-	41.05 (17.44)
(control *n*=2)			
(experimental *n*=0)			
	Experience	-	30.00 (-)
	Gender	-	2 males (0 females)
Athletics	Age	35.42 (10.59)	32.29 (7.65)
(control *n*=3)			

(experimental *n*=4)			
	Experience	10.25 (5.18)	9.00 (6.92)
	Gender	3 males (1 female)	1 male (2 females)
Volleyball (control *n*=1) (experimental *n*=3)	Age	33.89 (9.24)	29.92 (-)
	Experience	8.33 (4.16)	5.00 (-)
	Gender	2 males (1 female)	1 male (0 females)

Table 3. Descriptive statistics and internal reliability estimates of study variables across all three measurement points.

	N	Min	Max	Mean	SD	Skew	Kurtosis	α
Willingness (T0)	1101	1.00	7.00	1.59	0.99	2.21	5.06	.92
Willingness (T1)	728	1.00	7.00	1.58	0.94	2.22	5.48	.94
Willingness (T2)	548	1.00	5.67	1.52	0.85	2.06	4.22	.92
Doping moral disengagement (T0)	1102	1.00	7.00	1.65	0.80	1.62	3.30	.75
Doping moral disengagement (T1)	728	1.00	7.00	1.64	0.85	2.20	6.97	.82
Doping moral disengagement (T2)	549	1.00	7.00	1.60	0.84	2.47	9.08	.83
Doping attitudes (T0)	1099	1.00	7.00	1.58	0.79	2.06	5.94	.88
Doping attitudes (T1)	476	1.00	7.00	1.55	0.87	2.67	9.67	.91
Doping attitudes (T2)	362	1.00	7.00	1.57	0.89	2.84	11.26	.90
Doping efficacy (T0)	1097	1.00	7.00	5.43	2.05	-1.14	-0.17	.97
Doping efficacy (T1)	476	1.00	7.00	5.70	1.92	-1.49	0.87	.98
Doping efficacy (T2)	361	1.00	7.00	5.70	1.94	-1.48	0.80	.99
Inadvertent doping (T0)	1099	0.00	6.00	0.57	1.06	2.26	5.72	
Inadvertent doping (T1)	475	0.00	6.00	0.55	1.13	2.46	6.31	
Inadvertent doping (T2)	362	0.00	6.00	0.51	1.06	2.48	6.35	
Doping knowledge (T0)	1099	0.00	6.00	2.46	1.46	0.14	-0.57	-
Doping knowledge (T1)	475	0.00	6.00	2.76	1.55	-0.16	-0.79	-
Doping knowledge (T2)	361	0.00	6.00	2.86	1.56	-0.27	-0.53	-
Need support (T0)	1102	1.00	7.00	5.76	0.81	-1.11	2.68	.73
Need support (T1)	475	1.50	7.00	5.70	0.89	-1.23	2.43	.82
Need support (T2)	363	2.67	7.00	5.87	0.82	-0.86	0.79	.79
Need thwarting (T0)	1102	1.00	6.19	2.31	0.90	1.04	1.49	.67
Need thwarting (T1)	475	1.00	5.89	2.37	0.92	0.81	0.50	.71
Need thwarting (T2)	363	1.00	5.25	2.27	0.94	0.72	0.06	.70
Need satisfaction (T0)	1095	1.15	7.00	5.50	0.89	-0.72	1.06	.84
Need satisfaction (T1)	721	1.00	7.00	5.46	0.96	-0.93	1.75	.87
Need satisfaction (T2)	544	1.00	7.00	5.57	1.03	-1.25	3.11	.88
Need frustration (T0)	1094	1.00	7.00	2.48	1.20	0.98	0.75	.89
Need frustration (T1)	721	1.00	6.42	2.36	1.13	.08	.13	.88
Need frustration (T2)	544	1.00	7.00	2.28	1.15	1.19	1.60	.90

Note: For doping knowledge and inadvertent doping, the descriptive statistics refer to the total number of correct answers. For these variables there is no reliability coefficient because they have only two possible answers for each question.

Table 4. Descriptive statistics and internal reliability estimates of study variables across all three measurement points.

	N	Min	Max	Mean	SD	Skew	Kurtosis	α
Efficacy to discuss doping (T0)	130	1.14	10	7.73	1.74	-1.19	1.80	.91
Efficacy to discuss doping (T1)	118	0	10	8.18	1.86	-2.09	5.70	.99
Efficacy to discuss doping (T2)	111	0	10	8.53	1.51	-2.12	8.19	.99
Efficacy to create anti-doping atmosphere (T0)	129	1	10	8.47	1.6	-1.72	3.89	.99
Efficacy to create anti-doping atmosphere (T1)	118	3	10	8.64	1.38	-1.52	2.63	.99
Efficacy to create anti-doping atmosphere (T2)	111	4.25	10	8.73	1.24	-1.22	1.56	.99
Encouragement of athletes to prevent inadvertent doping (T0)	130	0	6	1.12	1.62	1.35	.81	.79
Encouragement of athletes to prevent inadvertent doping (T1)	118	0	6	2.85	2.05	-.48	-1.23	.78
Encouragement of athletes to prevent inadvertent doping (T2)	110	0	6	2.84	2.84	-.056	-1.24	.80
Moral disengagement (T0)	130	1	4.33	1.38	.55	2.13	6.24	.67
Moral disengagement (T1)	118	1	6	1.33	.72	4.49	24.32	.89
Moral disengagement (T2)	111	1	6.83	1.35	.68	5.17	37.86	.89
Attitudes toward doping (T0)	130	1	3.25	1.33	.50	1.86	3.35	.71
Attitudes toward doping (T1)	118	1	4.13	1.26	.47	2.82	11.68	.79
Attitudes toward doping (T2)	111	1	3	1.28	.41	1.68	2.58	.68
Doping knowledge (T0)	130	0	6.00	3.48	1.39	-.61	-.17	-
Doping knowledge (T1)	118	1	6.00	4.96	.99	-1.37	3.24	-
Doping knowledge (T2)	110	0	6.00	4.88	1.10	-1.25	2.59	-
Effectiveness of Need Support (T0)	129	1	7	5.84	5.87	-1.9	3.5	.77
Effectiveness of Need Support (T1)	118	1	7	.96	1.03	-1.88	3.56	.82
Effectiveness of Need Support (T2)	111	1	7	-1.9	-1.88	-1.89	6.05	.86
Effectiveness of Need Thwarting (T0)	129	1	7	2.59	.98	.99	1.12	.72
Effectiveness of Need Thwarting (T1)	118	1	6	2.19	1.08	1.57	3.5	.83
Effectiveness of Need Thwarting (T2)	111	1	7	1.97	1.02	1.71	3.56	.84

Note: For doping knowledge the descriptive statistics refer to the total number of correct answers. For this variable there is no reliability coefficient because they have only two possible answers for each question.

Intervention Effects on Doping-Related Variables

Athlete data.

Overviews of the results of the multilevel analyses are detailed in Tables 5 and 6. With regard to intention-to-treat analyses of the doping-related variables (see Table 5), there were two statistically significant effects of the intervention group (labelled as ExpCond → S1 in the table). The first was for self-efficacy to resist doping temptations, for which the change over time was, on average, .26 lower for the experimental group than the control group. The second change was for doping knowledge, for which the change in athletes' responses to the quiz was on average, was .20 higher for the experimental group than the control group. These differences were not replicated in the per protocol analysis (see Table 6). Country was an important predictor (see UKref → S1 and GRCref→ S1 in Table 5) of changes over time in the use of prohibited substances, doping knowledge, and willingness. Specifically, athletes in the UK control group reported lower use of prohibited substances and greater doping knowledge and willingness, compared to the three country averages on these variables. It was not possible to compare whether this rate of change was significantly different between conditions, as a model testing country x condition x time effects did not converge. These findings were similar across the intention-to-treat and per protocol analyses. Another finding consistent across both analyses was that the intervention group had lower attitudes, higher efficacy and lower moral disengagement scores at baseline, compared to the control group (indicated by the S21 mean in Table 5). This difference was consistent across countries (indicated by UKref → S21 and GRCref→ S21 in Table 5). Another finding that replicated across both analyses was that hours of training were positively associated with willingness to dope at baseline. Lastly, males reported higher scores for positive attitudes toward doping and for inadvertent doping at baseline, however, these findings were not replicated in the per-protocol

analyses. There was minimal change in the other doping-related variables for both intention-to-treat and per protocol analyses.

Table 5. Intention-to-treat effect of CoachMADE intervention on athlete reported doping-related variables, controlling for gender, age, hours per week spent training, and number of years with current coach (3-level multilevel model with random intercepts and slopes).

	Dependent Variable (DV)						
	Attitudes	Doping Efficacy	Inadvertent Doping	MDE	Prohibited Use	Quiz	Willingness
Level 1: Time							
DV residual	.40 (.36, .45)	2.30 (2.00, 2.66)	.63 (.56, .71)	.31 (.27, .34)	-	1.23 (1.08, 1.39)	.34 (.30, .39)
Level 2: Athletes							
ExpCond → S1	.01 (-.10, .12)	-.26 (-.50, -.04)	-.02 (-.16, .14)	-.03 (-.11, .06)	.08 (-.48, .74)	.20 (.02, .37)	-.03 (-.12, .06)
Gender → DV	.14 (.01, .27)	.00 (-.32, .32)	.25 (.09, .41)	.11 (-.01, .24)	.07 (-.59, .04)	.12 (-.12, .34)	.04 (-.10. 1.8)
Age → DV	.00 (-.01, .01)	.01 (-.02, .02)	.00 (-.01, .01)	.00 (-.01, .01)	-.01 (-.05, .04)	.02 (.01, .04)	.00 (-.01, .01)
Hours training → DV	.02 (-.01, .04)	.05 (-.001, .10)	.00 (-.03, .02)	.01 (-.01, .03)	-.02 (-.15, .15)	.04 (.01, .08)	.03 (.01, .05)
Years coach → DV	.02 (-.01, .05)	.00 (-.06, .06)	.03 (-.01, .06)	.00 (-.02, .03)	.00 (-.15, .15)	.01 (-.03, .06)	.02 (-.01, .05)
DV ↔ S1	.01 (-.02, .04)	-.41 (-.71, -.12)	-.03 (-.10, .02)	-.01 (-.05, .02)	.42 (-1.11, 1.36)	-.09 (-.21, .05)	-.12 (-.17, -.07)
DV residual	.20 (.14, .26)	1.48 (1.01, 1.94)	.30 (.22, .41)	.29 (.24, .36)	2.42 (.99, 5.18)	.66 (.43, .88)	.56 (.47, .65)
S1 residual	.01 (.001, .04)	.28 (.05, .55)	.04 (.01, .10)	.02 (.001, .06)	1.28 (.31, 2.69)	.09 (.01, .21)	.07 (.03, .11)
Level 3: Coach							
UKref → S1	-.03 (-.14, .08)	-.10 (-.37, .17)	.03 (-.12, .18)	-.01 (-.11, .10)	-1.33 (-2.41, -.49)	.31 (.12, .50)	.11 (.01, .21)
GRCref → S1	.88 (-2.64, 4.96)	-3.27 (-11.31, 4.62)	.94 (-1.85, 3.81)	-.06 (-.16, .04)	-.44 (-1.33, .34)	2.42 (-1.67, 10.74)	.08 (-.01, .18)
UKref → S21	.07 (-.14, .28)	.04 (-.51, .62)	.10 (-.20, .39)	.00 (-.18, .18)	-.40 (-2.35, .92)	.23 (-.21, .67)	-.08 (-.30, .13)
GRCref → S21	.08 (-.12, .29)	-.44 (-1.00, .12)	.54 (.24, .83)	.08 (-.10, .25)	-1.01 (-2.70, .39)	-.30 (-.77, .17)	-.09 (-.30, .13)
DV ↔ S1	-.01 (-.03, .02)	-.06 (-.24, .07)	-.03 (-.10, .04)	-.01 (-.03, .01)	-.01 (-.82, .63)	.02 (-.06, .09)	-.01 (-.03, .01)
DV ↔ S21	-.08 (-.19, -.01)	-.35 (-.94, .04)	-.41 (-.74, -.17)	-.06 (-.14, -.01)	.02 (-2.05, 1.03)	-.29 (-.72, -.01)	-.12 (-.26, -.03)

S1 ↔ S21	.01 (-.03, .04)	.06 (-.12, .26)	.03 (-.05, .12)	.00 (-.03, .02)	.02 (-.35, .48)	-.07 (-.19, .04)	.01 (-.02, .03)
DV mean/threshold	1.68 (1.58, 1.79)	5.24 (4.98, 5.47)	.67 (.49, .86)	1.72 (1.63, 1.82)	3.92 (2.86, 5.35)	2.56 (2.37, 2.76)	1.69 (1.56, 1.82)
S1 mean	.31 (-.87, 1.62)	-.91 (-3.47, 1.78)	.34 (-.61, 1.32)	-.02 (-.08, .05)	-1.32 (-2.79, .50)	.84 (-.51, 3.61)	.01 (-.05, .08)
S21 mean	-.23 (-.37, -.11)	.54 (.21, .87)	-.14 (-.36, .09)	-.14 (-.27, -.03)	-.09 (-1.00, .81)	-.07 (-.34, .20)	-.22 (-.38, -.06)
DV variance	.09 (.04, .16)	.37 (.14, .77)	.41 (.25, .66)	.06 (.02, .14)	1.68 (.60, 4.62)	.27 (.13, .53)	.13 (.06, .25)
S1 variance	.02 (.01, .04)	.08 (.02, .22)	.03 (.01, .07)	.01 (.005, .03)	.25 (.10, .73)	.04 (.01, .10)	.01 (.001, .01)
S21 variance	.11 (.02, .28)	.69 (.08, 1.72)	.51 (.14, 1.02)	.07 (.02, .19)	.45 (.12, 3.67)	.64 (.11, 1.45)	.14 (.03, .33)

Note: Bayesian estimator (with non-informative priors); values in parentheses represent the 95% credibility interval; S1 = random effect that represents the expected rate of change in DV per unit increase in time; S21 = random effect that represents the overall difference in DV between the experimental (1) and control groups (0); ExpCond = experimental condition; MDE = doping moral disengagement; grey shade = credible parameter estimate; UKref = British athletes are the reference group; GRCref = Greek athletes are the reference group.

Table 6. Per protocol analysis effect of CoachMADE intervention on athlete reported doping-related variables, controlling for gender, age, hours per week spent training, and number of years with current coach (3-level multilevel model with random intercepts and slopes).

	Dependent Variable (DV)						
	Attitudes	Doping Efficacy	Inadvertent Doping	MDE	Prohibited Use	Quiz	Willingness
Level 1: Time							
DV residual	.40 (.36, .45)	2.24 (1.96, 2.54)	.62 (.56, .70)	.31 (.27, .34)	-	1.27 (1.11, 1.43)	.34 (.31, .38)
Level 2: Athletes							
ExpCond → S1	.01 (-.11, .13)	-.26 (-.52, .08)	-.06 (-.20, .17)	-.01 (-.10, .08)	.07 (-.64, .82)	.21 (-.01, .41)	-.04 (-.12, .05)
Gender → DV	.13 (-.09, .35)	.09 (-.40, .58)	.17 (-.13, .45)	.07 (-.08, .21)	-.16 (-1.13, .70)	.05 (-.39, .51)	-.02 (-.17, .14)
Age → DV	.00 (-.01, .02)	.01 (-.02, .04)	.01 (-.002, .03)	.00 (-.01, .01)	-.01 (-.08, .06)	.03 (.01, .06)	.00 (-.02, .01)
Hours training → DV	.01 (-.03, .04)	.08 (.01, .15)	-.05 (-.09, -.01)	.02 (-.01, .04)	.06 (-.10, .23)	.00 (-.06, .06)	.04 (.01, .07)
Years coach → DV	.01 (-.03, .05)	.01 (-.08, .09)	.03 (-.02, .07)	.00 (-.03, .03)	.03 (-.16, .24)	.05 (-.02, .11)	.02 (-.01, .05)
DV ↔ S1	.01 (-.03, .04)	-.19 (-.51, .07)	.02 (-.03, .06)	-.02 (-.06, .001)	.45 (-1.39, 1.66)	-.10 (-.26, .04)	-.10 (-.15, -.06)
DV residual	.19 (.13, .28)	1.17 (.67, 1.69)	.21 (.11, .32)	.36 (.29, .43)	4.01 (1.42, 7.13)	.77 (.51, 1.08)	.57 (.47, .68)
S1 residual	.02 (.01, .05)	.15 (.02, .41)	.03 (.01, .08)	.01 (.001, .04)	1.00 (.30, 2.96)	.06 (.01, .22)	.03 (.01, .07)
Level 3: Coach (team)							
UKref → S1	-.02 (-.08, .05)	-.06 (-.21, .09)	.03 (-.06, .11)	-.02 (-.12, .09)	-1.54 (-2.67, -.60)	.15 (.05, .26)	.13 (.02, .23)
GRCref → S1	-	-	-	-.06 (-.15, .04)	-.26 (-1.13, .54)	-	.10 (.01, .20)
UKref → S21	.05 (-.07, .17)	.04 (-.28, .38)	.06 (-.11, .23)	.07 (-.16, .29)	.08 (-1.75, 1.69)	.10 (-.15, .35)	-.11 (-.38, .14)
GRCref → S21	-	-	-	.08 (-.14, .28)	-1.43 (-3.46, .19)	-	-.10 (-.34, .13)
DV ↔ S1	.00 (-.04, .03)	-.10 (-.40, .08)	-.03 (-.12, .04)	.00 (-.03, .01)	-.12 (-1.26, .51)	.01 (-.13, .11)	-.01 (-.04, .02)
DV ↔ S21	-.10 (-.26, -.10)	-.40 (-1.24, .11)	-.41 (-.94, -.10)	-.06 (-.17, -.003)	-.13 (-3.10, 1.02)	-.53 (-1.29, -.08)	-.13 (-.28, -.04)
S1 ↔ S21	.00 (-.04, .05)	.00 (-.27, .27)	.02 (-.07, .13)	.00 (-.03, .02)	.02 (-.43, .86)	-.04 (-.20, .11)	.00 (-.03, .02)
DV mean/threshold	1.64 (1.49, 1.80)	5.45 (5.08, 5.81)	.52 (.26, .79)	1.74 (1.62, 1.86)	4.27 (3.05, 5.82)	2.73 (2.41, 3.07)	1.63 (1.48, 1.79)
S1 mean	.03 (-.06, .13)	.13 (-.12, .40)	.07 (-.05, .22)	-.03 (-.10, .04)	-.88 (-2.34, .04)	.09 (-.08, .25)	.02 (-.05, .09)
S21 mean	-.20 (-.42, -.01)	.52 (.02, 1.04)	-.12 (-.48, .21)	-.16 (-.31, -.002)	-.03 (-1.12, 1.14)	-.15 (-.57, .27)	-.17 (-.36, .03)

DV variance	.10 (.03, .24)	.50 (.15, 1.24)	.43 (.21, .84)	.06 (.01, .16)	1.45 (.29, 5.12)	.52 (.22, 1.16)	.13 (.05, .28)
S1 variance	.02 (.01, .05)	.11 (.02, .32)	.03 (.01, .08)	.01 (.002, .02)	.28 (.10, .92)	.03 (.01, .10)	.01 (.001, .02)
S21 variance	.14 (.02, .39)	.90 (.12, 2.32)	.56 (.10, 1.35)	.08 (.01, .024)	.56 (.14, 4.51)	.91 (.16, 2.16)	.16 (.05, .37)

Note: Bayesian estimator (with non-informative priors); values in parentheses represent the 95% credibility interval; S1 = random effect that represents the expected rate of change in DV per unit increase in time; S21 = random effect that represents the overall difference in DV between the experimental (1) and control groups (0); ExpCond = experimental condition; MDE = doping moral disengagement; grey shade = credible parameter estimate; UKref = British athletes are the reference group; GRCref = Greek athletes are the reference group.

Coach data.

Overviews of the results of the multilevel analyses are detailed in Tables 7 and 8. There were two statistically significant effects of the intervention group (labelled as ExpCond → S1 in the tables). The first finding was for coaches' self-efficacy to confront athletes regarding doping matters, for which the change over time was, on average, .45 higher in the experimental group than the control group. The second change was in coaches' reports of need supportive interpersonal style, for which the changes over time was, on average, .23 higher in the intervention group than the control group. These two effects were similar in magnitude and credibility when we considered only those coaches who completed the protocol (see Table 9). In terms of country differences, both the intention to treat and per protocol analyses showed that Greek coaches in the control group reported lower changes per assessment period beyond baseline scores, compared to all coaches, in terms of their efficacy to create an anti-doping atmosphere and prevent inadvertent doping, use of practices that prevent inadvertent doping, and anti-doping knowledge. The UK coaches in the control group also reported lower changes per assessment period beyond baseline scores on encouragement of practices to prevent inadvertent doping and anti-doping knowledge, compared to the all coaches in the sample. It was not possible to compare whether this rate of change was significantly different between conditions, as a model testing country x condition x time effects did not converge. There were no gender differences on any variables at baseline. Years of coaching was positively related to efficacy to confront doping and anti-doping knowledge at baseline, and previous anti-doping education was positively related to encouragement of practices that prevent inadvertent doping in both intention to treat and per protocol analyses.

Table 7. Intention-to-treat effect of CoachMADE intervention on coach reported doping-related and motivational variables, controlling for gender, previous doping education, and number of years coaching (2-level multilevel model with random intercepts and slopes).

	Dependent Variable (DV)							
	Efficacy Anti-Doping Atmosphere	Efficacy Doping Confrontation	Inadvertent Doping	Attitudes	MDE	Quiz	Need Support	Need Thwarting
Level 1: Time								
DV residual	.78 (.60, 1.02)	1.44 (1.13, 1.82)	.84 (.68, 1.03)	.04 (.03, .05)	.34 (.29, .42)	.84 (.68, 1.04)	.45 (.35, .58)	.42 (.33, .55)
Level 2: Athletes								
ExpCond → S1	.20 (-.11, .52)	.45 (.08, .80)	-.06 (-.33, .20)	-.03 (-.11, .06)	-.10 (-.27, .06)	-.06 (-.33, .20)	.23 (.002, .47)	.09 (-.14, .32)
Gender → S1	.09 (-.27, .44)	.13 (-.30, .58)	.08 (-.24, .39)	.00 (-.10, .10)	-.05 (-.24, .16)	.08 (-.24, .39)	.14 (-.14, .41)	-.11 (-.38, .16)
Doping education → S1	-.10 (-.42, .23)	-.20 (-.58, .20)	-.22 (-.51, .05)	.03 (-.06, .12)	.00 (-.18, .18)	-.22 (-.51, .05)	-.14 (-.38, .09)	-.07 (-.31, .17)
Years coaching → S1	-.01 (-.03, .01)	-.03 (-.04, -.01)	-.02 (-.03, -.002)	.00 (-.003, .01)	.01 (-.002, .01)	-.02 (-.03, -.002)	-.01 (-.02, .01)	.00 (-.01, .01)
UKref → S1	.44 (.06, .82)	.13 (-.33, .58)	-.47 (-.80, -.13)	-.01 (-.12, .09)	-.02 (-.17, .24)	-.47 (-.80, -.13)	-.02 (-.30, .25)	-.01 (-.29, .27)
GRCref → S1	-.40 (-.79, -.01)	-.58 (-1.03, -.14)	-.47 (-.81, -.14)	.01 (-.10, .11)	.04 (-.17, .24)	-.47 (-.81, -.14)	-.07 (-.35, .22)	-.07 (-.36, .21)

ExpCond → DV	-.31 (-1.09, .45)	-.81 (-1.64, .03)	.07 (-.55, .69)	-.11 (-.36, .12)	.11 (-.22, .47)	.07 (-.55, .69)	-.26 (-.74, .22)	-.49 (-1.00, .03)
Gender → DV	.21 (-.58, 1.02)	.07 (-.85, .97)	-.06 (-.72, .63)	.09 (-.16, .34)	.19 (-.21, .56)	-.06 (-.73, .63)	-.20 (-.72, .32)	.12 (-.43, .67)
Doping education → DV	.55 (-.26, 1.35)	.89 (-.02, 1.76)	.99 (.33, 1.64)	-.15 (-.41, .10)	-.07 (-.46, .28)	.99 (.33, 1.64)	.48 (-.01, .97)	-.10 (-.64, .44)
Years coaching → DV	.04 (.00, .08)	.06 (.02, .10)	.01 (-.02, .04)	.00 (-.02, .01)	-.01 (-.03, .01)	.01 (-.02, .04)	.02 (-.01, .04)	.02 (-.01, .05)
UKref → DV	-1.41 (-2.35, -.48)	-1.03 (-2.07, .02)	1.27 (.51, 2.03)	.30 (.01, .60)	.14 (-.30, .54)	1.27 (.51, 2.03)	-.02 (-.60, .55)	-.14 (-.78, .49)
GRCref → DV	-.09 (-1.06, .88)	.36 (-.69, 1.43)	.57 (-.20, 1.34)	.03 (-.28, .33)	.06 (-.37, .49)	.57 (-.20, 1.35)	-.35 (-.95, .25)	.15 (-.51, .80)
DV ↔ S1	-.75 (-1.36, -.28)	-.30 (-1.02, .07)	-.20 (-.56, -.01)	-.09 (-.14, -.05)	-.02 (-.10, .01)	-.20 (-.56, -.01)	-.15 (-.39, .03)	-.25 (-.52, -.04)
DV mean	7.65 (6.64, 8.61)	6.64 (5.51, 7.78)	2.88 (2.08, 3.70)	1.45 (1.14, 1.76)	1.37 (.89, 1.85)	2.87 (2.08, 3.70)	5.62 (5.00, 6.21)	2.85 (2.18, 3.51)
S1 mean	.15 (-.26, .58)	.51 (-.01, 1.04)	.83 (.46, 1.18)	-.05 (-.17, .06)	-.03 (-.26, .22)	.83 (.46, 1.18)	.03 (-.28, .34)	-.22 (-.54, .09)
DV residual	2.65 (1.46, 4.20)	1.80 (.65, 3.58)	.90 (.31, 1.81)	.35 (.25, .50)	.07 (.01, .25)	.90 (.31, 1.81)	.58 (.16, 1.15)	1.00 (.46, 1.65)
S1 residual	.30 (.08, .56)	.15 (.01, .49)	.07 (.01, .24)	.03 (.02, .05)	.02 (.001, .06)	.07 (.01, .24)	.13 (.04, .25)	.15 (.05, .29)

Note: Bayesian estimator (with non-informative priors); values in parentheses represent the 95% credibility interval; S1 = random effect that represents the expected rate of change in DV per unit increase in time; ExpCond = experimental condition; grey shade = credible parameter estimate; UKref = British athletes are the reference group; GRCref = Greek athletes are the reference group.

Table 8. Per protocol analysis effect of CoachMADE intervention on coach reported doping-related and motivational variables, controlling for gender, previous doping education, and number of years coaching (2-level multilevel model with random intercepts and slopes).

	Dependent Variable (DV)							
	Efficacy Anti-Doping Atmosphere	Efficacy Doping Confrontation	Inadvertent Doping	Attitudes	MDE	Quiz	Need Support	Need Thwarting
Level 1: Time								
DV residual	.81 (.62, 1.06)	1.50 (1.19, 1.89)	.77 (.61, .96)	.04 (.03, .05)	.38 (.31, .46)	.77 (.61, .96)	.47 (.37, .62)	.45 (.34, .59)
Level 2: Athletes								
ExpCond → S1	.27 (-.05, .60)	.49 (.10, .87)	-.11 (-.37, .16)	-.03 (-.12, .06)	-.12 (-.29, .06)	-.11 (-.37, .16)	.25 (.01, .50)	.08 (-.17, .32)
Gender → S1	.04 (-.37, .44)	.25 (-.25, .75)	.29 (-.04, .64)	-.06 (-.17, .06)	-.12 (-.35, .12)	.29 (-.04, .64)	.13 (-.19, .43)	-.16 (-.47, .15)
Doping education → S1	-.10 (-.43, .24)	-.15 (-.55, .25)	-.13 (-.42, .16)	-.01 (-.10, .09)	-.04 (-.23, .15)	-.13 (-.42, .16)	-.15 (-.41, .11)	-.09 (-.35, .16)
Years coaching → S1	-.01 (-.03, .01)	-.03 (-.05, -.01)	-.02 (-.03, -.01)	.00 (-.003, .01)	.01 (-.003, .02)	.02 (-.03, -.004)	-.01 (-.02, .002)	.00 (-.02, .01)
UKref → S1	.33 (-.06, .72)	.04 (-.44, .51)	-.43 (-.76, -.11)	.04 (-.07, .14)	.03 (-.19, .24)	-.43 (-.76, -.11)	-.06 (-.36, .24)	.04 (-.26, .34)
GRCref → S1	-.47 (-.87, -.07)	-.61 (-1.11, -.12)	-.45 (-.78, -.09)	.03 (-.08, .15)	.07 (-.18, .29)	-.45 (-.78, -.09)	-.05 (-.36, .27)	.06 (-.25, .37)

ExpCond → DV	-.36 (-1.16, .41)	-.81 (-1.69, .05)	.28 (-.38, .93)	-.13 (-.39, .13)	.13 (-.25, .51)	.28 (-.38, .93)	-.14 (-.67, .37)	-.51 (-1.10, .06)
Gender → DV	.29 (-.70, 1.29)	-.40 (-1.57, .73)	-.62 (-1.47, .22)	.34 (.001, .67)	.40 (-.12, .92)	-.62 (-1.47, .22)	-.34 (-1.01, .34)	.51 (-.24, 1.24)
Doping education → DV	.50 (-.32, 1.33)	.84 (-.08, 1.77)	.76 (.06, 1.48)	.01 (-.27, .28)	.00 (-.40, .42)	.76 (.06, 1.48)	.52 (-.03, 1.08)	.02 (-.59, .63)
Years coaching → DV	.04 (-.002, .08)	.05 (.01, .10)	.02 (-.01, .06)	-.01 (-.02, .01)	-.01 (-.03, .01)	.02 (-.01, .06)	.02 (-.01, .05)	.02 (-.01, .05)
UKref → DV	-1.02 (-1.96, -.06)	-.66 (-1.75, .42)	1.28 (.47, 2.09)	.10 (-.22, .41)	-.02 (-.48, .45)	1.28 (.47, 2.09)	.24 (-.40, .88)	-.34 (-1.05, .35)
GRCref → DV	.21 (-.78, 1.19)	.50 (-.62, 1.64)	.63 (-.23, 1.47)	-.10 (-.43, .24)	-.05 (-.52, .48)	.63 (-.23, 1.47)	-.32 (-.99, .35)	-.22 (-.96, .51)
DV ↔ S1	-.51 (-1.04, -.13)	-.19 (-.81, .10)	-.18 (-.51, -.003)	-.08 (-.13, -.05)	-.02 (-.11, .01)	-.18 (-.51, -.003)	-.15 (-.42, .03)	-.22 (-.52, .001)
DV mean	7.45 (6.65, 8.85)	7.26 (6.02, 8.50)	3.28 (2.34, 4.20)	1.23 (.86, 1.59)	1.17 (.62, 1.70)	3.28 (2.34, 4.20)	5.56 (4.81, 6.30)	2.47 (1.65, 3.30)
S1 mean	.14 (-.30, .59)	.35 (-.18, .88)	.62 (2.5, 1.00)	.01 (-.12, .13)	.05 (-.20, .30)	.62 (.25, 1.00)	.06 (-.29, .41)	-.16 (-.51, .18)
DV residual	1.82 (.83, 3.22)	1.26 (.35, 2.89)	.91 (.34, 1.81)	.32 (.22, .48)	.09 (.01, .31)	.91 (.34, 1.81)	.59 (.15, 1.24)	1.00 (.42, 1.77)
S1 residual	.22 (.05, .46)	.15 (.02, .43)	.06 (.01, .21)	.03 (.02, .05)	.02 (.002, .06)	.06 (.01, .21)	.13 (.04, .27)	.14 (.03, .28)

Note: Bayesian estimator (with non-informative priors); values in parentheses represent the 95% credibility interval; S1 = random effect that represents the expected rate of change in DV per unit increase in time; ExpCond = experimental condition; grey shade = credible parameter estimate; UKref = British athletes are the reference group; GRCref = Greek athletes are the reference group.

Table 9. Intention-to-treat effect of CoachMADE intervention on athlete reported motivation variables, controlling for gender, age, hours per week spent training, and number of years with current coach (3-level multilevel model with random intercepts and slopes).

	Dependent Variable (DV)			
	Needs Support	Needs Thwarting	Needs Frustration	Needs Satisfaction
Level 1: Time				
DV residual	.59 (.52, .66)	.66 (.58, .74)	.56 (.49, .64)	.43 (.39, .48)
Level 2: Athletes				
ExpCond → S1	-.07 (-.20, .08)	.03 (-.11, .19)	-.05 (-.16, .08)	.07 (-.03, .17)
Gender → DV	-.31 (-.48, -.15)	.18 (.02, .35)	.17 (.003, .34)	-.06 (-.19, .07)
Age → DV	.01 (-.01, .02)	.00 (-.01, .01)	.00 (-.01, .01)	.00 (-.01, .01)
Hours training → DV	.02 (-.003, .05)	.00 (-.03, .02)	.04 (.01, .07)	.01 (-.02, .03)
Years coach → DV	.05 (.01, .08)	-.04 (-.07, -.003)	-.01 (-.05, .02)	.03 (.003, .06)
DV ↔ S1	.01 (-.05, .06)	.00 (-.08, .04)	-.16 (-.24, -.08)	.01 (-.03, .05)
DV residual	.35 (.24, .45)	.30 (.20, .41)	.71 (.58, .85)	.24 (.18, .31)
S1 residual	.03 (.01, .09)	.04 (.01, .12)	.13 (.06, .20)	.03 (.01, .06)
Level 3: Coach (team)				
UKref → S1	.05 (-.08, .18)	.00 (-.14, .14)	-.14 (-.28, .01)	.04 (-.08, .17)
GRCref → S1	-.46 (-4.90, 3.86)	-.73 (-6.07, 5.41)	-.02 (-.16, .12)	-.02 (-.15, .11)
UKref → S21	-.10 (-.42, .24)	.14 (-.19, .46)	.08 (-.30, .47)	.02 (-.26, .30)
GRCref → S21	-.23 (-.35, .34)	-.33 (-.66, .01)	.08 (-.31, .47)	-.48 (-.77, -.19)
DV ↔ S1	-.04 (-.10, .01)	-.01 (-.08, .05)	.00 (-.04, .04)	-.00 (-.04, .03)
DV ↔ S21	-.23 (-.52, -.03)	-.30 (-.67, -.07)	-.18 (-.46, .02)	-.12 -.29, -.003)
S1 ↔ S21	.01 (-.06, .08)	.00 (-.07, .09)	-.06 (-.13, .00)	-.03 (-.08, .01)
DV mean	5.31 (5.14, 5.47)	2.30 (2.12, 2.47)	2.61 (2.46, 2.77)	5.45 (5.33, 5.58)
S1 mean	-.13 (-1.61, 1.31)	-.31 (-2.04, 1.75)	-.07 (-.16, .02)	.00 (-.08, .08)
S21 mean	.24 (.02, .45)	-.16 (-.39, .05)	-.28 (-.51, -.06)	.10 (-.07, .28)
DV variance	.28 (.16, .49)	.33 (.18, .57)	.18 (.07, .36)	.12 (.06, .23)
S1 variance	.02 (.01, .06)	.03 (.01, .06)	.02 (.01, .05)	.02 (.01, .05)

S21 variance	.35 (.05, .88)	.42 (.06, 1.06)	.50 (.10, 1.02)	.27 (.04, .57)

Note: Bayesian estimator (with non-informative priors); values in parentheses represent the 95% credibility interval; S1 = random effect that represents the expected rate of change in DV per unit increase in time; S21 = random effect that represents the overall difference in DV between the experimental (1) and control groups (0); ExpCond = experimental condition; MDE = doping moral disengagement; grey shade = credible parameter estimate; UKref = British athletes are the reference group; GRCref = Greek athletes are the reference group.

Intervention Effects on Motivation-Related Variables

The effects of the intervention on motivation-related variables reported by the athletes were small and non-credible (see Tables 9 and 10).

Intervention Effects on Doping-Related Variables via Motivational Factors

An overview of the results of the path analyses are provided in Table 11. Consistent with the multilevel models, the effects of the experimental group on athletes' perceptions of the coach interpersonal style were small and non-significant. With the exception of the use of prohibited substances at baseline and long-term follow-up, baseline assessments were salient determinants of athletes' reports of the same variable at post-intervention and long-term follow-up. Overall, perceptions of the coach's interpersonal style were associated with athletes' beliefs regarding the satisfaction or frustration of their basic psychological needs. Needs frustration was a salient determination of doping willingness, moral disengagement, and doping attitudes at both post-intervention and long-term follow-up. All indirect effects from the experimental condition were close to zero and statistically inconsequential. Because there is a categorical variable (doping behaviour) in the model, fit statistics are unavailable.

Table 10. Per protocol analysis effect of CoachMADE intervention on athlete reported motivation variables, controlling for gender, age, hours per week spent training, and number of years with current coach (3-level multilevel model with random intercepts and slopes).

	Dependent Variable (DV)			
	Needs Support	Needs Thwarting	Needs Frustration	Needs Satisfaction
Level 1: Time				
DV residual	.60 (.53, .68)	.67 (.58, .76)	.59 (.51, .69)	.49 (.44, .55)
Level 2: Athletes				
ExpCond → S1	-.05 (-.17, .10)	.02 (-.16, .18)	-.02 (-.20, .15)	-.02 (-.15, .13)
Gender → DV	-.42 (-.72, -.12)	.39 (.10, .68)	.29 (-.02, .60)	.05 (-.20, .30)
Age → DV	.01 (-.003, .03)	-.01 (-.02, .01)	.00 (-.02, .02)	.00 (-.01, .02)
Hours training → DV	.02 (-.02, .07)	.01 (-.03, .05)	.02 (-.02, .07)	.02 (-.02, .05)
Years coach → DV	.06 (.01, .11)	-.03 (-.08, .02)	.02 (-.04, .07)	.02 (-.02, .06)
DV ↔ S1	-.01 (-.09, .04)	-.02 (-.12, .04)	-.17 (-.29, -.06)	.02 (-.02, .05)
DV residual	.43 (.31, .59)	.36 (.23, .51)	.61 (.44, .81)	.22 (.14, .31)
S1 residual	.02 (.002, .09)	.05 (.002, .13)	.17 (.07, .27)	.01 (.002, .05)
Level 3: Coach (team)				
UKref → S1	.05 (-.02, .12)	-.01 (-.09, .08)	-.08 (-.17, .01)	.01 (-.06, .08)
UKref → S21	-.06 (-.24, .12)	.08 (-.11, .26)	.04 (-.20, .27)	.01 (-.16, .19)
DV ↔ S1	-.04 (-.12, .02)	-.01 (-.08, .06)	-.01 (-.08, .04)	-.02 (-.06, .01)
DV ↔ S21	-.24 (-.66, -.03)	-.25 (-.68, -.01)	-.14 (-.51, .06)	-.02 (-.16, .06)
S1 ↔ S21	.01 (-.07, .09)	.00 (-.09, .09)	-.06 (-.18, .05)	-.05 (-.12, -.001)
DV mean	5.34 (5.10, 5.58)	2.28 (2.06, 2.50)	2.43 (2.23, 2.65)	5.66 (5.52, 5.81)
S1 mean	.04 (-.07, .13)	-.02 (-.14, .10)	-.10 (-.24, .05)	.03 (-.09, .14)
S21 mean	.23 (-.07, .54)	-.03 (-.33, .26)	-.16 (-.49, .16)	.14 (-.10, .38)
DV variance	.32 (.13, .69)	.24 (.09, .58)	.16 (.04, .41)	.06 (.01, .18)
S1 variance	.02 (.004, .069)	.03 (.01, .08)	.03 (.01, .08)	.03 (.01, .06)

S21 variance	.35 (.05, .99)	.43 (.08, 1.11)	.54 (.11, 1.22)	.24 (.07, .53)

Note: Bayesian estimator (with non-informative priors); values in parentheses represent the 95% credibility interval; S1 = random effect that represents the expected rate of change in DV per unit increase in time; S21 = random effect that represents the overall difference in DV between the experimental (1) and control groups (0); ExpCond = experimental condition; MDE = doping moral disengagement; grey shade = credible parameter estimate; UKref = British athletes are the reference group.

Table 11. Standardised direct effects of a path analysis of the hypothesised theoretical sequence depicted in Figure 6.

	Post-Intervention (T1)		Long-Term Follow-Up (T2)	
	β	95% CI	β	95% CI
Nthw0 → Nthw	.49	.38, .60	.40	.26, .55
Expcond → Nthw	-.05	-.20, .09	.08	-.10. .26
Country → Nthw	.00	-.13, .14	.06	-.15, .26
Interaction → Nthw	-.05	-.21, .11	-.12	-.34, .10
Nthw0 → Nsup	.42	.28, .55	.33	.21, .45
Expcond → Nsup	-.03	-.17, .12	-.08	-.26, .10
Country → Nsup	-.09	-.22, .05	.02	-.16, .21
Interaction → Nsup	.06	-.11, .22	.01	-.20, .21
Nfrus0 → Nfrus	.21	.10, .32	.10	.01, .19
Nsup → Nfrus	-.13	-.24,-.03	-.11	-.28, .06
Nthw → Nfrus	.56	.44, .65	.49	.35, .63
Nfrus → Nsat	.24	.13, .35	.15	.06, .23
Nsup → Nsat	.60	.41, .78	.45	.26, .64
Nthw → Nsat	-.03	-.16, .10	-.12	-.31, .08
Will0 → Will	.44	.32, .56	.21	.07, .36
Nfrus → Will	.18	.08, .29	.24	.11, .38
Nsat → Will	-.09	-.20, .02	.00	-.11, .10
MDE0 → MDE	.34	.24, .45	.24	.10, .37
Nfrus → MDE	.21	.10, .32	.27	.12, .43
Nsat → MDE	-.01	-.13, .10	.02	-.13, .17
Att0 → Att	.36	.21, .51	.24	.09, .40
Nfrus → Att	.13	.03, .24	.13	.03, .23
Nsat → Att	-.10	-.21, .01	.04	-.07, .15
Eff0 → Eff	.37	.25, .49	.17	.02, .30
Nfrus → Eff	-.09	-.22, .05	-.07	-.23, .09
Nsat → Eff	.02	-.13, .16	.06	-.10, .22
Dope0 → Dope	.38	.28, .49	.17	-.01, .34
Will → Dope	.11	-.11, .33	.19	.04, .35
MDE → Dope	.09	-.19, .36	.01	-.14, .15
Att → Dope	.00	-.24, .23	.13	.02, .24
Eff → Dope	-.08	-.32, .16	.07	-.13, .27
Inadv0 → Inadv	.37	.23, .51	.30	.15, .44
Will → Inadv	-.02	-.13, .09	-.06	-.15, .02
MDE → Inadv	-.11	-.26, .04	.05	-.07, .17
Att → Inadv	.08	-.06, .22	-.07	-.19, .05
Eff → Inadv	-.14	-.24, -.03	.07	-.04, .19
Know0 → Know	.44	.35, .52	.33	.21, .46
Will → Know	-.07	-.18, .04	-.01	-.12, .10
MDE → Know	-.01	-.10, .07	-.09	-.23, .06
Att → Know	.06	-.04, .15	.07	-.02, .16
Eff → Know	.04	-.06, .14	.18	.08, .29

Note: Expcond = experimental condition (0 = control, 1 = intervention); Country (-1 = UK, 1 = Australia); Interaction = interaction term between experimental condition and country; Nthw = needs thwarting; Nsup – needs support; Nfrus = needs frustration; Nsat = needs satisfaction; Will = willingness; MDE = doping moral disengagement; Att = doping attitudes; Eff = efficacy to resist doping temptations; Dope = use of prohibited substances; Inadv = inadvertent doping; Know = knowledge of anti-doping.

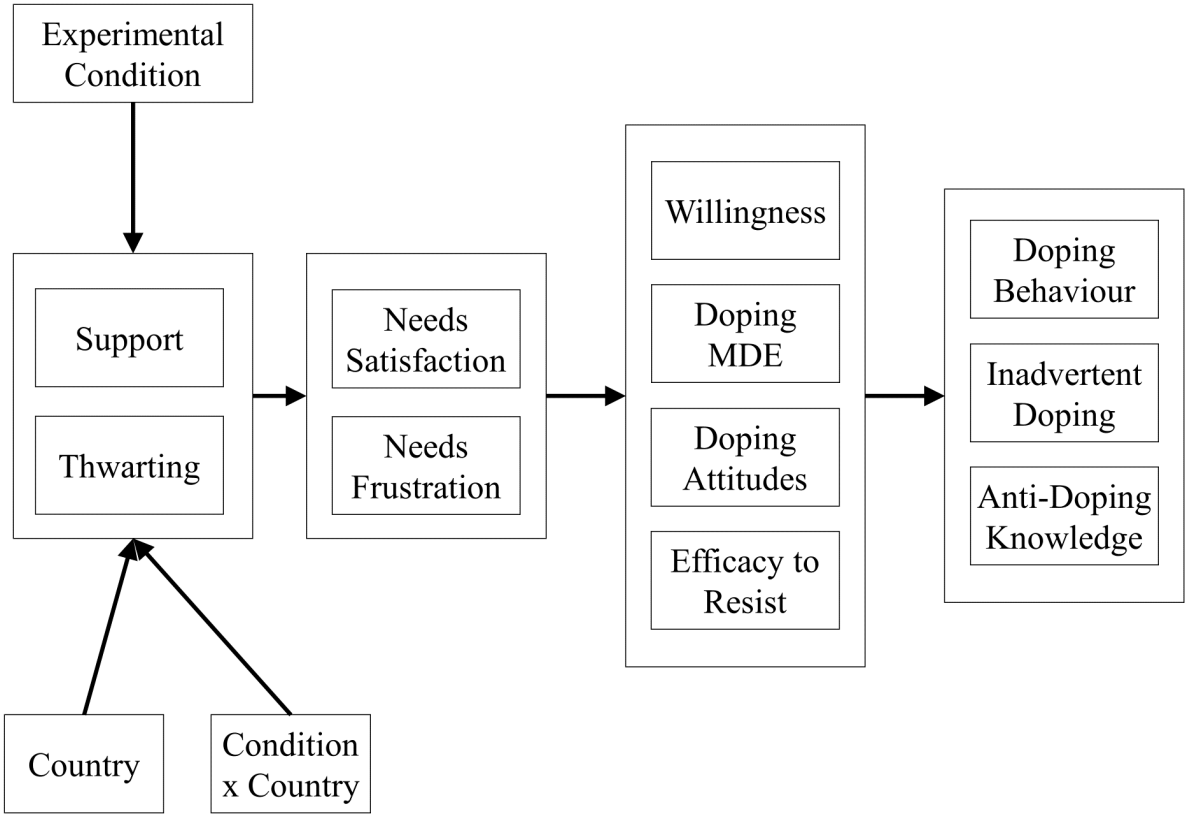


Figure 6. Visual depiction of the hypothesised theoretical sequence via which motivationally enriched training in coach anti-doping education affects doping-related outcomes. (Reprint)

Note: variables encompassed within a single border are correlated; experimental condition = control (0) and intervention (1); country = UK (-1) and Australia (1).

Process Evaluation

A thorough process evaluation of the CoachMADE program was conducted throughout the delivery of the intervention. The process evaluation was guided by the framework introduced by Saunders, Evans, and Joshi (2005), which suggests that researchers must review the fidelity, dose, reach, recruitment, and context of an intervention in order to inform policy and practice. Using a mixed methods approach, we explored the experiences of coaches and researchers who were involved in the CoachMADE program. Quantitative data was collected from coaches in both the control and intervention conditions following the workshops and at two subsequent time points in the project (six weeks and 12 weeks post-workshop). The qualitative data was gathered through 18 post-program interviews with coaches who took part in the intervention condition and the reflections from workshop deliverers across all three countries. The process evaluation aimed to understand the coaches' experiences of the CoachMADE program and assess the feasibility of implementing a coach focused anti-doping intervention.

Methods

Quantitative Sample Characteristics

All coaches in the intervention and control conditions were asked to complete a satisfaction survey at the end of each workshop attended. Coaches completing the theory-informed intervention were also asked questions on their understanding of the theoretical messages and behavioural strategies outlined in the workshops. A total of 173 questionnaires were completed following the workshops (Table 12). Additional quantitative data was collected from coaches in the control and intervention conditions at the end of the intervention (i.e., six weeks post workshops) and follow-up (i.e., 12 weeks post-workshops). These questions explored the coaches' engagement with the materials provided in the workshops and their overall satisfaction with the training they had received. A total

of 113 and 106 questionnaires were completed at the end of the intervention and follow-up, respectively.

Table 12. Number of coaches who completed the surveys at each time point.

Condition	Workshop 1	Workshop 2	End of the intervention	Follow-up
Intervention	59	61	56	54
Control	53		59	52

Qualitative Sample Characteristics

Qualitative data was captured using open-ended survey questions, interviews, and workshop deliverer reflections. The triangulation of data provides a wider and deeper understanding of individuals' involvement with the CoachMADE project (Turner, Cardinal, & Burton, 2017). The survey data included a number of open-ended questions, whereby coaches in both conditions were asked to provide information on the workshop content, and the extent to which the training they took part in had influenced the athletes they coach. Six coaches from each of the three countries volunteered to take part in a post-program interview (Table 13). All 18 coaches had attended both of the intervention workshops and completed data collection at baseline, the end of the intervention, and follow-up. This is important because coaches who took part in each phase of the research program were able to report on the overall implementation and impact of the project.

Table 13. Characteristics of the coaches who were interviewed.

Country	Coach	Gender	Sport	Coaching level
Australia	1	Male	Aussie Rules Football	Recreational
	2	Male	Tennis	International
	3	Male	Hockey	Recreational
	4	Male	Hockey	National
	5	Male	Squash	National
	6	Female	Netball	National
Greece	1	Male	Basketball	Recreational
	2	Male	Track and Field	National
	3	Male	Taekwondo	Recreational
	4	Male	Basketball	Recreational
	5	Male	Basketball	Recreational
	6	Male	Rowing	National
UK	1	Male	Hockey	Recreational
	2	Male	Swimming	International
	3	Male	Triathlon	Recreational
	4	Male	Cycling	National
	5	Male	Swimming	National
	6	Female	Synchronised swimming	National

The interviews were facilitated by a semi-structured interview guide (see Appendix 3) to ensure that information relevant to the process evaluation was captured, while allowing the interviewees an opportunity to share information they perceived as important (Sparkes & Smith, 2014). Open questions were included in the interview guide to encourage coaches to share their experiences on the implementation, context, and impact of the CoachMADE program. For example, the interview guide contained open questions such as, “how did things go in your coaching practice following your participation in CoachMADE?” and “was there anything that you felt couldn’t be easily integrated with your coaching style?” Furthermore, seven workshop deliverers completed a number of reflections throughout the research project. These reflections addressed our experiences surrounding recruitment, fidelity and satisfaction of the workshops, and the delivery of a theory-based intervention. These reflections were collated in an online document prior to analysis.

Quantitative Data Analysis

Survey data were entered into the SPSS software and grouped based on the condition the coach had been randomly assigned throughout the project. Responses were then counted and probability data calculated (i.e., median). The data were compared across both conditions. In the intervention condition, differences between workshop one and workshop two were analysed using a Wilcoxon signed rank test. An alpha error rate of 0.05 was used for all statistical tests.

Qualitative Data Analysis

Abductive logic was applied in order to explore the individual's experiences of the CoachMADE project while using the framework introduced by Saunders et al. (2005). The 18 interview transcripts, the qualitative survey data, and the workshop deliverers' reflections were analysed using thematic analysis procedures (Braun, Clarke & Weate, 2016). First, we constructed inductive codes which represented the experiences and reflections of the individuals involved in the project. Next, we searched for and identified themes (i.e., patterns in the data). Following this, we deductively applied a framework. Specifically, each theme was reviewed, defined, and named as one of the five constructs, specified by Saunders et al. (2005): (1) reach and recruitment, (2) implementation: dose delivered, (3) implementation: fidelity and satisfaction, (4) context, and (5) impact to evaluate the CoachMADE program. While applying the framework, we remained open to additional findings. However, the data fitted well with the framework and therefore Saunders et al's (2005) five constructs were maintained in the final thematic structure.

Results

The results of the process evaluation were conceptualised into the five aforementioned themes. These themes describe how the CoachMADE project was carried out and received by coaches

across the sporting communities of Australia, Greece, and the UK. The themes are presented using both quantitative and qualitative data. This mixed method approach ensured that an in-depth understanding of coaches' and workshop deliverers' experiences were complemented with the detailed assessment of patterns in the coaches' responses (McCusker & Gunaydin, 2015). All quotes have been anonymised and pseudonyms have been used to protect the identity of the coaches' interviews. However, country and an identification number are stated (e.g., Australia, coach 1) to provide insights into who has provided each quote.

Reach and Recruitment

This theme provides an overview of the reach and recruitment of coaches to the CoachMADE program across the sporting communities of Australia, Greece, and the UK. Addressing the quantitative data collected throughout the project and the researchers' reflections, this section provides an overview of the number of individuals contacted, the means of communication, and the factors which hindered the recruitment process.

The project aimed to recruit 120 coaches and approximately 1200 of their athletes across the three countries. After an intensive recruitment drive in each country, 954 individuals were contacted which included coaches (n= 874), club/league officials (n= 4), and university sport representatives (n= 8), and individuals from national governing bodies (NGBs; n= 38), local councils (n= 30). One-hundred-and-thirty-five coaches consented to participate in the study (15 % response rate; see Table 14).

Table 14. The number of individuals who were contacted and responded throughout the recruitment process.

	Australia	Greece	UK
Number of people contacted for recruitment.	140	120	694
Number of responses.	100	100	144

Number of coaches who came forward.	136	70	78
Number who signed up.	64	58	50
Number who took part.	44	45	46

Coaches were recruited via social media, email, and verbal communication (e.g., telephone calls). It is important to note that although a number of coaches responded to email communication from the research team, verbal communication elicited a much greater response. Thus, email invitations were not conducive to coach recruitment in this study. Furthermore, although initial recruitment was through national governing bodies, the most effective means of recruitment in all countries was through private and professional networks. Having said this, different strategies were required in different countries. In the UK and Australia, recruitment through sports clubs was beneficial to mass participation. In comparison, in Greece, the research team found that recruitment through sports clubs was difficult because coaches were unable to identify an appropriate time that was suitable for all coaches.

Factors that impacted recruitment.

Despite our efforts to make the project accessible (e.g., deliver the workshop at the coaches' training environment), time and timing were barriers to recruitment. With regards to a lack of time, one Australian coach reported, "I suppose the big thing to look at is the time aspect, between work, coaching, and family life" (Australia, coach 5). One UK workshop deliverer suggested that offering the program to coaches at different times of the season may have increased participation in the program:

> I found that a number of coaches reported being too busy to attend the sessions, and stated that the timings of the workshops often cut across their coaching. Therefore, the recruitment drive may have been more successful if the workshops were offered to coaches out of their competitive season. (UK, workshop deliverer 2).

However, with regards to timing, the research team needed to ascertain the impact of the intervention on athletes (i.e., the coach had to be actively working with their athletes at the time of data collection across all time points) and this meant that coaches were often recruited during the competitive season.

Implementation: Dose delivered and received

This theme draws upon the quantitative data provided by coaches and athletes who took part in the CoachMADE project in order to assess the implementation of the intervention with specific reference to the dose delivered and received. Addressing the quantitative data collected throughout the project, this section provides an overview of coaches' and athletes' involvement in the project. In particular, the results capture workshop attendance, the dose of workshops, and attrition rate.

Coach attendance across the workshops.

On average, 57 coaches from Australia, Greece, and the UK signed up to participate in the study (range 50-64). However, in each country approximately 12 coaches dropped out of the study across both condition prior to taking part in the workshops. In Greece and the UK, it was noted that these coaches dropped out due to a lack of time, or coaches were unable to attend due to the timing and location of the workshops. In Australia, no reasons were provided by coaches who could not attend the workshops. In the latter phase of recruitment, the Australian team delivered the workshops exclusively within club facilities to address the timing and location barriers.

Two workshops were delivered in the intervention condition and the control condition comprised of one workshop. There was an even spread of coaches across the three countries who received the intervention and control as intended (Table 15). The three countries delivered 15 doses of the first intervention workshop, 16 doses of the second intervention workshop and 23

doses of the control workshop. Table 15 shows the number of workshops delivered and the number of coaches across the three countries.

Table 15. The number of workshops delivered in each country and the range of coaches who attended each session.

	Frequency			Range of coaches who attended each session			Total number of coaches
	Intervention Workshop 1	Intervention Workshop 2	Control Workshop	Intervention Workshop 1	Intervention Workshop 2	Control Workshop	
Australia	5	5	7	2-6	2-6	3-5	53
Greece	5	6	7	3-5	2-6	2-5	49
UK	5	5	9	3-8	3-8	1-6	46

The number and timings of the intervention workshops.

Coaches reported that the number of workshops and the length of the workshops was suitable. One Australian coach commented:

> I didn't have an issue with the length of the sessions, they were quite spot on. I think it was 2-3 hours on a couple of nights during the week … It wasn't an issue because we got breaks in between. It wasn't too overloaded. (Australia, coach 5)

In another quote, a UK coach agreed that the length was appropriate and discussed the timings of the CoachMADE workshops in comparison to other workshops he had attended:

> I thought it was all fine, it worked really well. It didn't seem too long and it didn't seem too short because some workshops do. I suppose the ultimate test was that I wasn't sat there thinking I should go home as we've been here quite a bit now, and what are we doing next? So yeah, I think it worked quite well and was good. (UK, coach 1)

While the coaches, did not report issues with the three-hour sessions, a workshop deliverer noted that the intervention was demanding for coaches, and suggested that this may have influenced elements of recruitment:

> From my perspective, the intervention in its entirety probably demanded too much time from coaches. I believe this is why you struggled so much with recruitment. The two workshops should be streamlined into 2 hours each or even shorter if possible. To aid in this, I believe some content could be translated to online videos that could be watched by the coaches before/between the sessions. (UK, workshop deliverer 1)

Coach attrition rate.

With regards to attrition, although 135 coaches signed up to take part in the study (see Table 14), 148 coaches received either the intervention workshops or the control workshop (see Table 15).

However, only 130 coaches received the relevant number of workshops in relation to the condition they were randomly assigned to at the beginning of the study and completed baseline measures (Table 16). This means that some coaches may have attended the workshops but not completed the baseline measures. Furthermore, the percentage of coaches who took part at the end of the intervention in comparison to the baseline measure was 91 % in both the intervention group and the control group. At follow-up, 80% of coaches in the control group, who provided baseline data, completed the relevant measures, and the percentage of coaches in the intervention group remained the same (91%). This demonstrates that the data for some coaches was missing at some time points.

Table 16. The total number of coaches who took part in each stage of data collection throughout the CoachMADE project.

	Condition	Baseline	End of intervention	Follow-up
Australia	Intervention	19	18	18
	Control	25	24	16
Greece	Intervention	22	20	21
	Control	18	16	18
UK	Intervention	23	20	19
	Control	23	20	19

Athlete involvement and data collection.

Table 17 shows the average number of athletes per coach who completed the measures across the three countries and three time points. A higher number of athletes took part in Australia and Greece compared to the UK, at all three data collection points. However, the overall attrition rate in the athlete sample appears similar across all three countries (46-56%).

Table 17. Mean ± SD of athletes per coach completing measures at baseline (B), end of the intervention (T2), and follow-up (T3).

	M ± SD of athletes per coach at B	M ± SD of athletes per coach at T2	M ± SD of athletes per coach at T3	Percentage of athletes who withdrew (B-T3)
Australia	9.31 (5.38)	7.67 (4.82)	6.70 (3.75)	56
Greece	9.21 (5.01)	6.46 (3.39)	6.04 (2.38)	48
UK	6.87 (4.21)	4.23 (2.12)	3.64 (2.37)	46

Implementation: Fidelity and satisfaction

This theme addresses the extent to which the delivery of the CoachMADE program adhered to the study protocol and provides insights into coaches' overall coach satisfaction with the program. The results provided in this section are formed from the workshop evaluation questionnaires, the deliverers' reflections, and the 18 post-program interviews with the coaches who took part in the intervention phase of the project. The results have been categorised into four subthemes: (a) satisfaction with the CoachMADE program, (b) acceptance of the intervention theory, (c) workshop structure, and (d) sustainability and implementation of the CoachMADE project. Table 18 shows the codes contributing to each subtheme.

Table 18. The fidelity and satisfaction of the CoachMADE program.

Code (this list is not exhaustive)	Subtheme	Theme
Coaches' enjoyed the workshops. Coach would recommend CoachMADE to others. Control workshops offered minimal room for discussion. Control workshops offered little support for coaches. Deliverer's enjoyed delivering workshops	Satisfaction with the CoachMADE program.	Fidelity and Satisfaction of the CoachMADE project.
Coaches' uptake of need supportive behaviours. Delivering SDT based interventions has issues surrounding uptake of needs supportive styles.	Acceptance of the intervention theory.	
A good balance of theory and practice. Appropriate workshop timings. Benefits of working with other coaches from other sports. Different formats of the workbook may help coaches who work differently. Doping information could be delivered online but motivational element requires face to face. Face to face sessions are considered more effective Gap between workshops allowed coaches' to reflect on their actions and implement things in their own environment. Gap between workshops could have been shorter. Limited information on how to initiate difficult conversations and practically applied learning. Open and inclusive environment with small group. Some of the Facebook content would have been good in the workshops. University delivery ensures that the workshop is independent of sport Workshops pitched appropriately.	Workshop structure.	
Anti-doping education was relevant for coaches. Anti-doping education was not relevant to recreational level coaches. Mandatory inclusion in professional accreditations nationwide.	Sustainability and implementation of the CoachMADE project.	

Coaches currently lack of understanding on anti-doping role.
Currently limited mandatory anti-doping education for coaches.

Satisfaction with the CoachMADE program.

This subtheme represents the coaches' overall satisfaction with the CoachMADE project and draws on both quantitative and qualitative data. Beginning with quantitative findings, Tables 19 and 20 show that coaches reported the intervention and control workshops as useful, beneficial to their athletes, and enjoyable. With reference to anti-doping roles and responsibilities, Tables 19 and 20 also show that coaches in both conditions reported they understood their anti-doping roles and responsibilities as a coach and were confident to have discussions with their athletes about anti-doping issues.

While the control workshop appears well received (see Table 19), a workshop deliverer from the UK shared their experiences of the workshops:

> My experience of delivering the CoachMADE [control] sessions was inherently similar to my role as [an anti-doping educator]. There was a lot of information to cover within a short space of time and limited chance for interaction and engagement with the audience. Despite this, the coaches seemed interested in the topic area and came with a range of anti-doping knowledge, which meant they were able to make valuable contributions to the sessions. Stimulating discussions within the small group sessions were particularly difficult as coaches would seek guidance from myself before thinking independently. The application of the GlobalDRO App was well received, and the coaches realised their knowledge gap when attempting to list the ADRVs. When delivering the session, I found session objectives set a

formal tone to the session, and I had limited opportunities to explore how they would use this information to best protect their athletes. (UK, workshop deliverer 3)

Table 19. Coaches' self-reported satisfaction with the workshops for the intervention and control group coaches.

Question	Condition	N	Frequencies for each response.				Median
			4	5	6	7	
The workshop was useful to me.	Intervention 1	59	1	2	24	32	7
	Intervention 2	61			21	40	7
	Control	53			19	34	7
The workshop was beneficial to my athletes.	Intervention 1	58	1	3	26	28	6
	Intervention 2	61		4	30	27	6
	Control	53	1	4	20	28	7
I enjoyed the workshop.	Intervention 1	58		1	16	41	7
	Intervention 2	61		1	23	37	7
	Control	51		1	20	30	7
I would recommend this workshop to other coaches.	Intervention 1	58		2	18	38	7
	Intervention 2	61			17	44	7
	Control	53	2	4	28	19	7
Following this workshop I now understand my anti-doping roles/responsibilities as a coach.	Intervention 2	61	1	4	28	28	6
	Control	52		2	23	27	7
Following this workshop I am now confident to have discussions with my athletes about anti-doping issues	Intervention 2	61	1	9	31	20	6
	Control	53	2	4	28	19	6

Note. Ratings were provided on a seven-point scale where 1 = *strongly disagree*, 2 = *disagree*, 3 = *somewhat disagree*, 4 = *neither agree nor disagree*, 5 = *somewhat agree*, 6 = *agree*, and 7 = *strongly agree*.

Table 20. M ± SD coaches' self-reported satisfaction with the workshops for the intervention and control group coaches.

	M ± SD		Z	*P* value
	Control	Intervention 1 & Intervention 2		
The workshop was useful to me.	6.64 (.48)	6.55 (.53)	-.996	.319
The workshop was beneficial to my athletes.	6.42 (.72)	6.39 (.56)	-.739	.457
I enjoyed the workshop.	6.57 (.54)	6.62 (.50)	-.358	.721
I would recommend this workshop to other coaches.	6.77 (.46)	6.66 (.48)	-1.945	.051
Following this workshop I now understand my anti-doping roles/responsibilities as a coach.	6.48 (.58)	6.36 (.684)	-.815	.410
Following this workshop I am now confident to have discussions with my athletes about anti-doping issues.	6.21 (.74)	6.15 (.727)	-.562	.579

Eight Mann Whitney tests were carried out to examine differences between the intervention and control conditions in the coaches' overall satisfaction of the CoachMADE program at the end of the intervention and at the follow up. At the end of the intervention, significant differences were seen in the coaches' reports on the overall satisfaction of the CoachMADE program (i.e., interesting and stimulating, tailored to their needs, and relevance) between the intervention condition and the control condition (Table 21). No significant differences in coaches' reported usefulness of the project to their professional development were found at the end of the intervention. Follow-up analysis (Table 22) showed that the only significant difference between the two conditions was found with regard to the perception that the project was tailored to the coaches' needs with coaches in the intervention group scoring higher than those in the control group. Overall, coaches in the intervention condition reported higher levels of satisfaction in the training they received than the control group at time points two and three (Figure 7).

Table 21. Coaches' self-reported satisfaction with the training provided to them at the end of the intervention..

Question	Condition	N	Frequencies for each response.							M ± SD	U	*Z*	*P*
			1	2	3	4	5	6	7				
The overall training in this project was interesting and stimulating.	Intervention	56	2			1	3	24	26	6.20 (1.21)	933.00	-4.252	**<.001**
	Control	59	1	7	1	9	7	24	10	5.14 (1.63)			
The overall training in this project was tailored to my needs.	Intervention	56	2			4	13	20	17	5.75 (1.30)	1203.50	-2.603	**.009**
	Control	59	3	3	5	3	17	20	8	5.03 (1.61)			
The overall training in this project was relevant to me as a coach.	Intervention	55	2				4	24	25	6.20 (1.19)	1106.50	-3.087	**.002**
	Control	59	2	7	2	6	7	18	17	5.22 (1.82)			
The overall training in this project was useful to my professional development.	Intervention	56	2			3	5	24	22	6.02 (1.27)	1338.50	-1.858	.063
	Control	59	4	5	1	4	5	23	17	5.34 (1.86)			

Note. Ratings were provided on a seven-point scale where 1 = *strongly disagree*, 2 = *disagree*, 3 = *somewhat disagree*, 4 = *neither agree nor disagree*, 5 = *somewhat agree*, 6 = *agree*, and 7 = *strongly agree.*

Table 22. Coaches' self-reported satisfaction with the training provided to them at follow-up.

Question	Condition	N	Frequencies for each response.							M ± SD	U	*Z*	*P*
			1	2	3	4	5	6	7				
The overall training in this project was interesting and stimulating.	Intervention	56	4	5		3	1	25	18	5.48 (1.89)	1181.00	-1.763	.078
	Control	52	3	9	1	1	10	16	12	4.96 (1.97)			
The overall training in this project was tailored to my needs.	Intervention	56	8	1		1	7	25	14	5.30 (1.97)	1149.00	-1.973	**.048**
	Control	52	4	2	4	5	11	20	6	4.94 (1.70)			
The overall training in this project was relevant to me as a coach.	Intervention	57	5	4		2	6	17	23	5.51 (1.95)	1246.50	-1.481	.139
	Control	52	5	4	5	4	4	15	15	4.98 (2.05)			
The overall training in this project was useful to my professional development.	Intervention	57	2	8	1	3	2	21	20	5.42 (1.90)	1190.50	-1.834	.067
	Control	52	3	9	2	2	8	17	11	4.88 (1.98)			

Note. Ratings were provided on a seven-point scale where 1 = *strongly disagree*, 2 = *disagree*, 3 = *somewhat disagree*, 4 = *neither agree nor disagree*, 5 = *somewhat agree*, 6 = *agree*, and 7 = *strongly agree.*

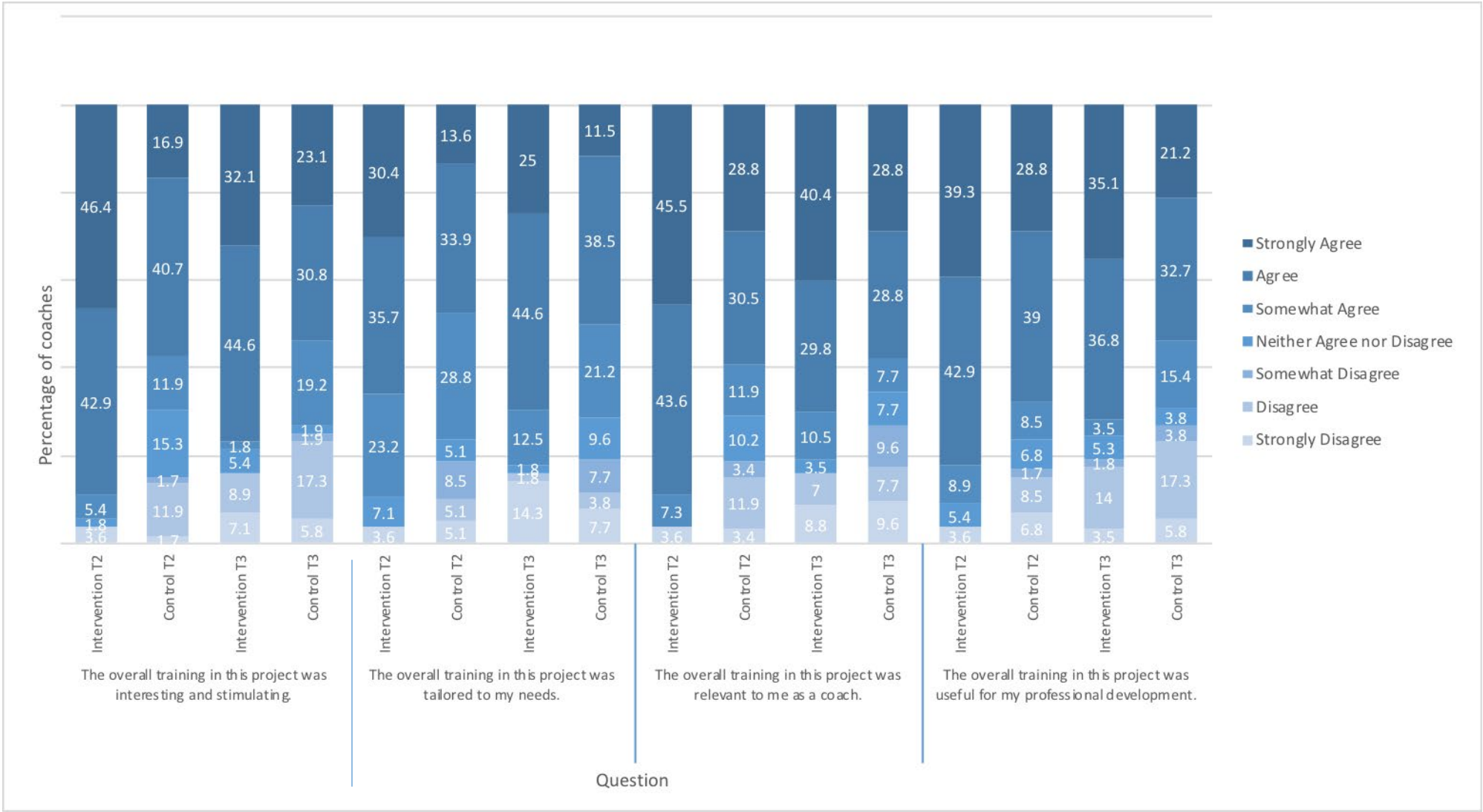


Figure 7. Coaches' self-reported satisfaction with the training provided to them at time points two and three in both the intervention and control conditions.

Acceptance of intervention theory.

This subtheme addresses the extent to which the theoretical messages conveyed in the project were understood and valued by the coaches. Using quantitative data collected throughout the project, reflections from the research team, and the experiences of the coaches, this section provides an overview of the coaches' uptake of the need supportive style of motivation, and the experiences of delivering a self-determination theory (Deci & Ryan, 2000) based intervention.

No differences were reported in coaches' confidence and implementation of the strategies outlined in the intervention workshops following workshop one and workshop two (Table 23). In addition, no differences were found in the coaches' intended use of the need supportive strategies discussed in the workshops. Nevertheless, significant increases were noted in the coaches' confidence to use the need supportive strategies outlined to them in the workshops between workshop one and workshop two (Table 24). However, non-significant differences were seen in the coaches' self-reported confidence in minimising their use of need thwarting strategies.

Table 23. Coaches' self-reported acceptance of need supportive strategies following the intervention workshops.

Question	Workshop	N	M ± SD	Z	*P* value
I feel confident to use the strategies I have been taught in this workshop.	Workshop 1	59	6.25 (.76)	-.513	.642
	Workshop 2	59	6.14 (.66)		
I feel sufficiently prepared to implement the strategies I have been taught in this workshop.	Workshop 1	59	6.05 (.78)	-.878	.392
	Workshop 2	61	6.07 (.70)		
I intend to use the training tools from this workshop in my coaching.	Workshop 1	59	6.53 (.63)	-.1.71	.952
	Workshop 2	61	6.44 (.65)		
I valued the theoretical messages conveyed in the workshop.	Workshop 1	58	6.66 (.55)	-1.15	.388
	Workshop 2	61	6.64 (.48)		

Table 24. Coaches' self-reported confidence to use need supportive and minimise need thwarting motivational strategies outlined in the intervention workshops.

		N	M ± SD	Z	*P* value
Confident to use need supportive strategies.	Workshop 1	59	5.95 (.68)	-3.261	.001
	Workshop 2	61	6.22 (.53)		
Confident to minimise need thwarting strategies.	Workshop 1	59	5.77 (.80)	-8.37	.407
	Workshop 2	61	5.76 (1.19)		

In support of the quantitative findings, we reflected on the extent to which the coaches understood the need supportive style presented in the CoachMADE program. The individuals who delivered the workshops in each of the three countries felt that the coaches developed a sound understanding of this approach throughout the workshops but were unable to comment on the extent to which a need supportive style was adopted in coaching practices:

> I can mainly comment as to the extent to which the coaches understood what a need supportive style is during the workshops and used it in role-playing. By and large, I think the coaches developed a very good understanding of what this style entails and were able to offer appropriate examples of it, relating to their coaching experience. In workshop tasks that asked coaches' input in determining what this style "looked like" (e.g., observing videos of other coaches, or the "soccer drill" activity), the coaches were able to articulate in what ways this style was in operation. In role-playing activities, there were some very impressive demonstrations of a need supportive style when a "coach" and an "athlete" discussed about doping. The coding of the audio tapes before and after the workshops will provide important answers to this question. (Australia, workshop deliverer 1)

The interview data support these results, as the coaches reported adopting a need supportive coaching style during their interactions with athletes and others outside of sport. For example, an Australian coach discussed the way in which he has changed his coaching practices following his participation in the CoachMADE program:

> I think it [the program] just affected my planning, [in] particular I focused on match day, rather than training, for these techniques. It changed the way I addressed players. It reinforced and made sure that I was more focused on engaging and giving the boys ownership. (Australia, coach 1)

In another example, one coach explained how he had begun to encourage athletes to focus on the journey and not the result:

> I've got myself a new catchphrase which is "enjoy the journey". So I've been talking a lot about this idea of a journey, and you know you've got your goal, you've got your destination where you are heading but actually if you enjoy the year of training, and the camaraderie of being part of a group, and being fit and healthy, and all of those intrinsic things, then actually the destination is not the be all and end all because you have had a great journey. So yeah I've been talking about that quite a lot, and I believe that you know. (UK, coach 3)

When considering the fidelity of the CoachMADE program, it is appropriate to address the workshop deliverers' experiences of providing an SDT-based intervention. A deliverer noted that although coaches reported using the need supportive strategies in their coaching, this was not implemented in a systematic fashion, thus, the content was not always received as proposed:

> Coaches told us that they were able to use need supportive strategies in their coaching, but I am doubtful as to the extent to which such application was systematic. When asked in the second workshop about how they applied this style in between the first and second workshop, most coaches admitted that they did not use in a systematic fashion the resources that were given to them at the end of the first workshop. None of the coaches reported any obstacles in utilising a need supportive communication style. (Australia, workshop deliverer 1)

Workshop structure.

This subtheme acknowledges how the structure of the intervention workshops influenced the fidelity and satisfaction of the CoachMADE project. Using the workshop deliverers' reflections and the voices of the coaches, we identified elements of the workshops which influenced the successful implementation of the CoachMADE program. To elaborate, this subtheme addressed the content, the materials, the delivery, and the timings of the workshops.

With reference to the content of the workshops, coaches reported that the workshops were pitched appropriately for the target audience. This can be seen in the following quote:

> I think it was pitched at the right level. The language and the content I could understand it fine, and some of it I hadn't seen before, or it was new information, but it was at the right level to make you feel like obviously getting something out of it, so I thought it had a good balance. (UK, coach 6)

Furthermore, in the following example one coach discusses how the information provided in the workshops was balanced and appropriate:

> For me it was pitched appropriately, I think it's difficult to say for someone with a greater knowledge of, and understanding of the psychology side of things whether it would be right for them but I think you would have to go on it and feedback, but certainly for me, I thought it was fine. I thought it was very well balanced. I thought it was very professionally delivered, I thought the content of it was right for the audience the information that you put across particularly on the motivational side, the way you sort of explained the ways and the not so good ways was at the right level. (UK, coach 5)

With reference to the materials used, coaches described how the materials used in the workshops stimulated discussion and learning. Specifically, one Greek coach described how the workbook, videos, and activities allowed him to understand how his athletes may perceive his behaviours:

> The book was the best supportive material. The videos were extremely useful to fully understand the green and red practices, as well as the role-playing, [and] how each person sees things, to see that each person sees things from a different perspective. (Greece, coach 6)

In another quote, an Australian coach discussed how the barometer presented in the workshops encouraged them to change their behaviour when issues arise in sport:

> My body language takes over. That gets transferred onto the players, they see the frustration or desperation, or sometimes hopelessness when things aren't going right. I try to make sure that I don't fall into those things. You do sometimes, but I think I have improved out of sight this year, purely just because of that red and green chart [barometer]. Straight away it clicks in, and that's when I think, where am I? Let's get out of that. Let's go to the next phase, let's assess why I'm doing [this] and how I can change this now? (Australia, coach 3)

Although coaches appeared satisfied with the content of the workshops, they made a number of recommendations for adapting/improving the information provided in the workshop, including increased opportunities to develop and share 'good' practice. To illustrate, one Australian coach recommended that the workshops should include further practical examples of the motivational strategies:

> [The workshops could include] a bit more practice. I remember the second workshop where there was a case study and we had to run through it. One was the athlete, one was the coach, and we had to run through that scenario. As such as people don't like running through role plays, but when you're dealing with people some people are great they walk up and talk about whatever and get their message across straight away. [However you] need to practice different scenarios because everyone you are delivering it to is different. (Australia, coach 5)

In support, another Australian coach suggested that guidance around initiating conversations with athletes around sensitive topics such as doping would have been beneficial:

> There wasn't much in the course I think in both modules talking about how to initiate that conversation. If you're not that way inclined and some coaches aren't, you hear of some coaches that are very removed from their playing group, very good coaches, but none of the players feel close to the coach … A lot of the discussions we are talking about will require

> more than just positional respect to have that and if you are not a coach that works strongly on personal relationships with the players or a degree of interaction with the players, then that would have been useful, more so in that second workshop about how to approach those sensitive issues because they can open up very quickly. (Australia, coach 1)

In another quote, one coach recommended additional sessions which included observing the coaches behaviours during practice:

> I think it would be really useful if they could almost monitor looking at coaching behaviour, nothing to do with the coaching side of it more the motivation side, so if he came a bit earlier and I told him what we were planning to do in the session, whatever sport it was he could monitor the coaches behaviour and say if you used the word I don't know, 'you must' 6 times do you want to try this 20 times, and it gives the coach a bit more independence. (UK, coach 1)

Turning to the delivery of the workshops, coaches and workshop deliverers discussed the academic involvement, the diversity of sports represented by coaches in the workshops, the face-to-face delivery of sessions, and the gap between the two workshops. A number of coaches reported the involvement of academics as beneficial. One coach said:

> I thought the delivery was fantastic. You guys certainly know what you're doing. I was impressed. Also, sometimes you feel like you've had it [because people are] trying to get too much information across, [but] I didn't find that at all. I found with the change we are trying to learn [some workshops are] not specific enough or tend to run off topic; you guys didn't. I found it was informative, it addressed what the course was supposed to address. That's what you're there for. I was pretty happy with it. (Australia, coach 3)

Interestingly, one coach identified that the academic involvement in the CoachMADE project was positively received because it presented a detachment from the sport or the national governing body (NGB). This can be seen in the following quote:

> I think it needs to be delivered by university academics who are coming at it from an anti-doping best practice approach and not almost like tainted by the experience of the sport. Tainted is the wrong word because it is assuming the negative, but you are coming at it from the best practice research in this and this. (UK, coach 4)

Although, the coaches were supportive of the academic delivery of the CoachMADE workshops, a workshop deliverer noted that including a coach in the delivery may enhance credibility and facilitate discussions:

> Although we were respected and listened to by all coaches, I do believe that having a person with coaching experience in the room to deliver or support delivery might increase perceived credibility in future - and also could help facilitate some of the discussions, especially when coaches are discussing challenges and how to overcome them. (UK, workshop deliverer 1)

This view was supported by a number of coaches, who identified that coaches with practical experiences of doping could facilitate future delivery of the CoachMADE program:

> You could maybe bring in other coaches who have experienced it maybe through the program or in real life examples, like in coming in to share their knowledge and examples and do it that way, I think, so having the combination of the practical and the theory work well and engage people with it. (UK, coach 2)

> I think in the ideal world it [the instructor] would be an academic with coaching experience. I would [like to] see a blend of both. I think the practical insight from a coach is important, and [the] academic is going to continually update and evolve the course, and I think you need the two working in tandem. (Australia, coach 1)

Moving to comments made regarding a number of different sports being represented in each workshop, coaches reported that this approach was beneficial and enhanced their experiences. One UK coach described how the inclusion of coaches from a range of sports was positive:

> It was also good with the other people that were there, some guys from football, swimming and cycling, so people from different sports, so it was really good to get their opinion and hear what they had to say and what it's like coaching, so they spoke about what challenges they had and it's good to have that wider spectrum of sports. (UK, coach 1)

Another coach discussed how the range of coaches in the workshop was positive because it encouraged him to identify new ways to tackle potential issues which may arise:

> I think it's good to have a range of sports for me personally. I like talking to people from separate areas sort of thing, some of the problems they come with, some of them can be the same, and I think someone outside your own field they might have tackled them a different way. In swimming we might have our own way of doing things, but if you speak to people outside of your comfort zone of swimming you almost come up with new ideas on what you could have done, and you might think well that might work in my areas as well. (UK, coach 2)

Coaches commented on the face-to-face delivery of the seminars, suggesting that this was a positive experience and promoted an open and inclusive environment. This can be seen in the following quote:

> I mean it's really good when there is a small group because it's normally informal and people just chat, don't they, and it's not like you have to put your hand up and wait to be called on that sort of thing. I guess if you had 25 people it might be a different dynamic but, but it felt, I mean you certainly didn't make me feel like I couldn't say anything, I mean it was very open in that sense. (UK, coach 3)

In another example, a Greek coach discusses how the facilitator in particular enhanced his experiences of the CoachMADE program:

> For me, I wish that there were more theoretical courses. In this case, I think that the facilitator makes the difference because everyone can a have a board and change the slides at the projector, but for me personally, if you are asking, that's the crucial factor in regard to the efficiency and the interestingness of the delivery. (Greece, coach 1)

Interestingly, although the coaches reported positive experiences from the face-to-face sessions, one coach suggested that the anti-doping education could have been covered online. However, she still valued face-to-face delivery and noted that it was important that the motivational elements were delivered face-to-face on this occasion:

> I mean the online advisor course is quite a good course, but it depends whether you want to address the motivation and that approach for me that is probably more face-to-face because that is about raising self-awareness which is not very easy to do online. Getting people the doping information online is one way and then have that assessment but in terms of addressing coaching behaviours and how coaches approach and motivate an athlete that's more self-awareness which takes more time which is why I think that would be more part of a face-to-face. (UK, coach 6)

Coaches and workshop deliverers addressed the timings of the workshops and the time between the two workshops. In Greece and Australia, both teams reported that all of the activities were completed in the workshops. However, in the UK the time spent on the action planning tasks at the end of the workshops was often reduced due to time constraints. In this context, it was noted:

> The timings for each activity differed across the workshops and in a number of workshops we were unable to spend the allotted amount of time on the action planning tasks at the end of the workshops. I believe this was due to the engagement from coaches in earlier

> activities and fruitful group discussion, which we chose not to cut short. (UK, workshop deliverer 2)

In support, in Australia a workshop deliverer acknowledged that elements of the workshops typically overran and, as a result, the workshops were extended by approximately 10 minutes:

> On all occasions, the presentation of the theory went approximately 10-20 minutes overtime. In my opinion, this was a result of the complex nature of the content, and the extra time was necessary to help support coaches' understanding. The workshops occasionally ran overtime by approximately 10 minutes. However, this was often due to coaches interacting beyond what was required with further questions and discussion. (Australia, workshop deliverer 3)

There were five weeks between the two workshops and coaches reported that the weeks in between allowed them to implement what they had learnt in workshop one in their coaching practice. For example, an Australian coach reported that the time in between the workshops allowed him the opportunity to have conversations with the athletes he coached: “It gave me time to go away and have those conversations with the players, and also to be able to think about ways or how to approach a conversation with the players. I thought it was pretty good” (Australia, coach 4). However, one Australian coach suggested that the workshops could have been positioned closer together, “We tried to get them four weeks apart, but we couldn’t. Wouldn’t want to go too much more than a month. You want to do it while is fresh” (Australia, coach 3). This was echoed by another Australian coach, yet, they suggested that the addition of the weekly tasks encouraged engagement: “[I] probably wouldn’t mind it being a bit closer, I suppose because we had the worksheets in between every week you had something to work on” (Australia, coach 5).

Sustainability and implementation of CoachMADE.

This subtheme captures the factors which may affect the maintenance and delivery of the CoachMADE program in the future. In this subtheme, we discuss the coaches' experiences of CoachMADE and the factors which will facilitate the development and dissemination of similar projects in the future. To elaborate, this subtheme addressed the relevance of anti-doping education for coaches and the landscape of anti-doping in sport.

Coaches' understanding of anti-doping roles may be compromised because mandatory anti-doping education is limited in current coach education programs, as one coach described: "I started coaching about four years ago, and on both my level one and level two the content that related to doping, anti-doping, was almost non-existent if I'm honest, there wasn't really much focus on it for new coaches" (UK, coach 5). Although training opportunities are limited, coaches in this study were supportive of anti-doping efforts. For example, one coach described how the topic of anti-doping should be viewed in a similar way to the safeguarding of children:

> For me, if you look at safeguarding and how widely spread that is, and that used to not be back in the day, but relatively recently that's now been included into coach education as compulsory. We just probably need to try and find a way where actually we add in anti-doping in the same way. So, if people viewed anti-doping awareness in the same way people viewed child safeguarding, which is at the utmost importance as its fundamental, then that would be the best way I think of reaching the masses. Then everybody in sport would know about it just like people know about child protection issues. (UK, coach 6)

In this program, the coaches in both conditions indicated that the workshops were relevant to themselves and their athletes (see Table 11). To illustrate, coaches in the control condition reported the following:

> "My athletes were interested in learning more about the subject." (Greece, coach)

> “Two of my students changed medication and had to check if they were able to compete still.” (UK, coach)

However, a number of coaches shared the belief that anti-doping education was not relevant for themselves and the athletes they coach. This was attributed to the level of competition of their athletes, a lack of previous exposure/experience with doping-related matters/issues in their practice and the assumption that their athletes would never engage in doping behaviours (and so, anti-doping efforts are unnecessary). This can be seen in the following three responses:

> “I train mostly juniors and beginner level athletes, so not very relevant at this stage.” (Australia, coach)
>
> “I haven't had any instances that have needed to look into anti-doping.” (Australia, coach)
>
> “They do not think anti-doping regulations apply to them nor have they ever considered them”. (Australia, coach)

Throughout the post-program interviews coaches described how the landscape of anti-doping in sport must shift before education programs, such as CoachMADE, would be seen as relevant by all who coach sport. For example, one coach identified the motivation element of the workshop as being a greater tool for marketing in the current climate:

> If you would promote this nationally, in terms of fostering and creating a positive learning environment for your team, how to motivate athletes and improve performance or tap into the things like resilience, self-esteem. How to ensure you are coaching your players to ensure you are building and strengthening self-esteem. Something that is more politically sensitive, in a marketing gimmick. Would mean that motivational side would resonate. Just don’t think that that anti-doping would [appeal] to the masses because they would perceive that it doesn’t apply. You have a whole lot of education that needs to occur to change that perception. (Australia, coach 1)

Context

This theme draws upon the 18 post-program interviews with coaches who took part in the intervention phase of the project and the research team's reflections of the development and delivery of the CoachMADE program, in order to assess its implementation within the sporting communities of Australia, the UK and Greece. The researchers' reflections and participants' experiences, were categorised into two subthemes: (a) factors which facilitated the implementation of CoachMADE, and (b) factors which hindered the implementation of CoachMADE (Table 25). Each subtheme captured the researchers' and coaches' experiences surrounding the implementation of the CoachMADE project. In particular, they referred to the perceived value of the workshop materials, the perceived relevance of coach focused anti-doping education, and factors in the external environment which may have facilitated or hindered the implementation of this intervention. The subthemes are presented using quotes from the research team and the interviewees in order to provide insight into the implementation of the CoachMADE program in practice.

Table 25. Factors that facilitated or hindered the CoachMADE project.

Codes (this list is not exhaustive)	Subtheme	Theme
Athletes could see the benefit of their coach's participation. Athletes' positive reactions. Athletes supported coach involvement. Club was supportive of involvement.	External support for the CoachMADE project.	Factors which facilitated the implementation of CoachMADE.
Anti-doping education is relevant at a performance level. Current coach education courses do not discuss doping enough. Important to have knowledge as athletes now take supplements. More cases in the media more involvement from coaches. Motivation content is seen as having more appeal to a wider audience. NGBs should promote the workshop as it is important. Responsibility of coach to know about doping.	Relevance of the topic to coaches.	
Action plans allowed coaches to reflect. Coaches used materials to inform their athletes and stimulate discussion on the topic of doping. Weekly activities kept coach engaged and added structure. Workbook provided a tool and resources coaches could return to.	Workshop materials.	
Coach found it difficult to initiate conversations around doping. Coach has limited time which affects the application of the project in practice. Coaches faced challenges as athletes played other sports. Coaches were concerned about the other influences on athletes like parents. Different sports have different levels of understanding. Difficult to put theory into practice around doping as situations didn't arise. Others perceived relevance of topic. When sport is so turbulent difficult to change behaviour.	External environment.	Factors which hindered the implementation of CoachMADE.
A larger group may have increased discussion Accountability to change behaviours was low. Coach didn't follow workbook in order. Facebook was not well received. Team examples were not as useful for individual sport coaches.	Workshop Structure.	

Factors which facilitated the implementation of the CoachMADE program.

This subtheme represents our interpretation of how the implementation of the CoachMADE project was influenced by contextual factors. This subtheme addressed the structure of the program, its relevance of anti-doping education, and the external factors which determined coaches' involvement in the project.

With reference to external support for the CoachMADE project, the coaches discussed how others in their network were supportive of their involvement in the project (e.g., athletes, fellow coaches, and sports clubs). For example, one Greek coach discussed how his athletes agreed to help him with the project because they understood the benefits their coach's involvement would have for them: "Yes, my athletes agreed to help me with the CoachMADE project because through my participation they would also have benefits" (Greece, coach 3). Similarly, an Australian coach reported that his athletes supported him when he attempted to implement changes to his coaching practice, "I asked them to help me with it when I say, 'should' or 'must'. So they could highlight it and say, 'there you go, you just did it'. They helped me with that" (Australia, coach 6). Besides athletes, some coaches reported that their sports clubs and other coaches within their clubs were supportive of their involvement in the project. A coach in the UK spoke about the support from other coaches in their sports club and reported that he had provided information about the project to them:

> They are generally quite supportive of development in any way. A lot of the coaches who couldn't commit to the time were quite interested in what we were doing. So, I have sat down with them and fed back what we have been doing to help them through that. (UK, coach 2)

In addition, one coach identified that his sports club was supportive of coach development opportunities:

> Yes absolutely, the club sort of since John took over as head coach has got a lot stronger, the performance has gone up, so our board, committee, are fully supportive of developing in all aspects of the sport, not just in the coaching side. (UK, coach 5)

Interestingly, when asked if others had been supportive of his involvement in the project one coach explained that support came in the form of people being interested in hearing what he had learned through informal conversations over time, rather than him formally imparting his knowledge to others:

> Interviewer: Were the people at the club, your colleagues, peers, and athletes supportive of your role in the project?
>
> Participant: That's a good question. The answer is certainly not no. I've had some really interesting conversations with athletes and other coaches, but I don't think it has been, "I have been on this course, I am now going to do this differently". You sort of incorporate what you learn into your practice on a gradual basis. So the answer is people have been really receptive and interested, but like I say it's not like we had a sit-down training session where I've said "now I will teach you what I have learnt", nothing that formal. (UK, coach 3)

Turning to the relevance of the topic to coaches, coaches spoke about how anti-doping is an important part of sport, and therefore, it is the responsibility of the coach to know about this topic. For example, one coach described how the prevalence of doping in sport is increasing, and is an important element of coach education:

> Doping is a prevalent thing in all sports at the minute so I think it is something that coaches should be aware of. I think it's something that for their own development if anything, that they should be aware of from both sides of the spectrum: the underlying motivations or the actual doping side. (UK, coach 2)

Similarly, coaches working in a high-performance environment reported that the program was

relevant for their professional development and for the athletes they coached. To illustrate, one Australian coach reported that anti-doping education was important, as a number of female athletes he coached took supplements:

> At a [performance level] environment it was highly relevant and turned out good, and now I'm having some exposure to the state talent, 18's, 16's and under 23's for the girls, it is relevant… Where particularly with the girls now taking supplements, it is quite important for them to have some knowledge (Australia, coach 1)

In terms of enhancing the perceived relevance of the program, some coaches reported that the inclusion of the motivation element of the course had attracted them to the CoachMADE project and, thus, this material had benefits for the implementation of the intervention. For instance, one coach spoke about how the motivation element of the project has a greater appeal to coaches from all backgrounds than anti-doping education delivered in isolation:

> I think it should be the focus more on the motivation side for this to appeal to the masses. It's more like you could break it up into components. So your elite level programs could go off and do module two, and that would be extending this into an anti-doping perspective, but I think the value from the motivational side/stand-alone unit would have more commercial value for you ... The motivational side and catching and promoting that side and how to create a positive learning environment for sport coaches and sporting teams that would be very powerful. (Australia, coach 1)

In the following quote, a coach identifies that the increasing media representation of doping in sport may increase coaches' involvement in (i.e., the perceived relevance of) the CoachMADE project:

> I think that the majority would be interested in it because it's becoming more and more to the fore now. I think only this morning one of the British middleweight boxing champions has just been identified as possibly falling foul albeit maybe innocently. So I think the more it

is in the media, the more likely to get people interested in doing it and finding out a bit more. (UK, coach 5)

A number of coaches identified that the materials used in the CoachMADE project facilitated the program. With reference to the CoachMADE workbook, coaches discussed how it acted as a tool they could personalise and return to within their coaching practice. To illustrate, one UK coach said:

> I think the workbook was good to be fair because I've put notes in and there is space for that. I think that it is important that you can personalise what you've got in front of you … I think there is more in it than possibly we discussed at times, so it is good to have it in a book. I mean, I've been back through it a couple of times actually. I think it's good it is all in one and is bound. It's not like a series of handouts because I think they are the kinds of things when you take them into your practice and you don't use it every week they just get lost, so it loses its worth. (UK, coach 1)

Furthermore, one coach identified that the additional materials provided throughout the program increased his confidence when approaching athletes around the topic of doping:

> Once those other resources became available to me, the conversations became easier for current athletes to be able to say if you're on a supplement you may want to think about this, go to this website, and check your stuff. It became more prevalent and more realistic … It gave the ability to start to have those conversations and feel confident about doing that. (Australia, coach 4)

In support, another Australian coach suggested that the materials facilitated the implementation of the CoachMADE project because the resources stimulated discussions with the athletes he coached:

> It provided tools that I could come back and present to the children. The tools that were there gave me a reason to talk to them actually. Otherwise, I'd have to make up a reason,

now look what I've got, I got this website to look at kids. That worked out really well. (Australia, Coach 2)

Similarly, one coach spoke about how he had used the materials to educate the athletes he coached:

> I thought the stuff that we've used back with the swimmers was really good such as, how to search the material or whatever they take, even the little things like if they take anti-histamines if they've got hay fever, they need to check whether it is in season or out of season or whether it's fine to take. Also, I thought having the material like Informed Sport, having the website there gave them an idea and helped us pass that on to them, and from the athlete side, they found that quite useful because they can just search it on their phones and we can sit there… I did especially the little YouTube videos that you sent across. I even showed some of the snippets of them to some of our athletes and the coaches; I thought again that was another way of learning what we were doing. (UK, coach 2)

The coaches discussed that the weekly action plans were a good way to ensure that they used the workshop information in their coaching practices. One UK coach identified that the structure of the weekly activities encouraged him to engage in the CoachMADE program and address the elements it discussed:

> When you go on a course [normally] there are a few weeks between sessions and the risk is that you sort of forget about it and then the weekend before the next session you sort of think, oh what have I got to do? So, by having that weekly structure, it made sure that you kind of addressed everything and that worked really well for me because I need structure like that. (UK, coach 3)

When considering the motivational aspect of the CoachMADE project in particular, coaches identified that the weekly activities and action plans between the two taught sessions provided an opportunity to address their behaviours. To illustrate, one Australian coach spoke about how the

action plans allowed him to reflect on his behaviour, and make changes to the ways in which he communicated with the athletes he coached:

> It was week by week, a particular scenario you went through, put your thoughts down, put it into practice at training, and you gave yourself a debrief after. I found that quite useful. It made me realise the way you do things. A lot of the time you don't, a lot of thought had to go into it; making sure you got the message, the actions you wanted, the behaviours you wanted. You were able to communicate them effectively. Then you can go back and go 'did it work or didn't it work?". It's being critical and evaluating yourself. (Australia, coach 5)

Factors which hindered the implementation of the CoachMADE program.

In this subtheme, we discuss how the implementation of the CoachMADE project was hindered by contextual factors, addressing the ways in which the structure of the workshops and the external environment influenced coaches' engagement and implementation of theory into practice.

With reference to the external environment, coaches reported that external factors such as the dynamic nature of sport, the influence of others on an athlete's motivations, the relevance of the topic to athletes, and time constraints influenced their involvement in the CoachMADE program. For example, one coach identified consistently using need supportive ('green') motivational strategies with the athletes he coached as a challenge in the training environment:

> Within a two hours swimming session there is a lot to fit in, there is a lot to say and do. You've got 30 swimmers in the pool and remembering to try and be green every time you speak to them was a challenge in itself definitely. (UK, coach 5)

Coaches identified that parents, athletes, and other coaches had an impact on the implementation of CoachMADE in practice. Specifically, one Greek coach spoke about how the athletes' attendance in training influenced his ability to carry out the activities within the CoachMADE program: "I applied them but at a theoretical level, because unfortunately, the team

wasn't that consistent in the attendance in training. As a result, that couldn't be applied with consistency" (Greece, coach 1). Moreover, coaches suggested that parents and other coaches may shape an athlete's motivations. For example, a UK coach spoke about the challenges associated with knowing and understanding the external influences on an athlete:

> Certainly, the challenges are understanding how wider things can affect people you know and how they are affected. Especially because they [athletes] are involved in other sports, and you can't know what their coaching environment is like in those other sports… One [athlete] competes on the world stage, and she is a world champion in another sport so, possibly she has different kind of drivers, and whatever else is out there. (UK, coach 1)

In another example, a coach spoke about the influence of parents on an athlete's motivations:

> During competitions or practice competitions the challenges we had was trying to get the same message across to parents as well. So we were talking about the process, learning the skills towards your greater goal, and then mum and dad were going "I paid x, y, z for this swim and you should have swum faster", stuff like that, so we had to try and get that message across to parents. (UK, coach 2)

While the coaches valued the anti-doping information provided in the CoachMADE project, researchers from the UK and Australia identified that recreational coaches did not consider the information relevant for the level of sport they coached: "Coaches of amateur/social sports indicated they didn't believe it was relevant information for their level of competition" (Australia, researcher 3). Adding further weight to this implementation barrier, a number of coaches identified that their athletes did not understand the relevance of this topic to them. For example, an Australian coach reported, "If there were any challenges [from the athletes] it would be, 'why are we sitting here talking about this Steve, we wouldn't do this'. It was a little bit challenging" (Australia, coach 2). In another example, a UK coach described how the athletes she coached articulated their perceptions of anti-doping education:

> Their attitude from being in a minority sport was, well we will never get tested so they were kind of like why are we doing this, we will never get tested, and I was like well don't you think it is useful that we value clean sport and they were like we won't intentionally dope. It's just that mentality like we're not bothered about anti-doping, we don't think we will ever get tested, so is this something I need to be worried about. (UK, coach 6)

Although the coaches reported that the content and delivery of the workshop was of high quality and was conveyed in an appropriate manner, researchers in Greece and the UK reported that some of the coaches did not complete the additional activities due to time constraints:

> The participants found the resources provided useful, with many of them following and completing the workbook, along with the action plans, but some of them said they have abandoned [these] on the way because they felt pressured by the time needed. (Greece, researcher 1)

In support, a UK coach discusses how they struggled to find time to complete these activities:

> It's been really useful the only issue I have with this whole thing is trying to find time to do it properly. I just get bogged down with other stuff, but that's a typical coach's life, just the standard stuff… I was just always trying to fit it in around the coaching, and it might not be an accurate perception, but I got the feeling, like, do we have to talk about this stuff let's just get out and ride. (UK, coach 4)

Activities outside the workshops were also raised when coaches discussed the workshop structure. Specifically, coaches reported that the accountability to complete the weekly tasks was low, and the structure of these influenced their engagement. To illustrate one coach stated that the CoachMADE program should include more accountability to help coaches change their behaviours if it was disseminated to a wider audience:

> I think the accountability to help change the behaviours as a coach is where it should be.

> Where if this was a course, there was probably not enough there. If I wasn't driven enough to do it, there probably wasn't enough there. (Australia, coach 1)

In another example, a UK coach described how the structure of the weekly activities, influenced her engagement with these tasks:

> I wasn't able to cover the weekly stuff. Because it's structured like. do this one week, week 2, week 3, and week 4, it feels like your failing already because you haven't done it in the right timing, right weeks… If it was more flexible, the first task is to do this and you can do it whenever and the next one is this, rather than making it time bound [that would help] because I felt like I had not done it properly, in the right order, in the right week, or at the right time. That's probably my feedback, maybe having a bit longer or maybe [suggesting] try and work through these scenarios and put this into your practice and reflect on it. It was mostly reflections, which is great but it's probably at different times, because everybody is busy at different times. So you could probably work it the way that it's going to fit best to you. (UK, coach 6)

The size of the group, and the use of Facebook as an engagement tool, was also discussed in relation to workshop structure. In the following example, a UK coach reported that a larger group of coaches could have supported the discussion elements of the CoachMADE workshops:

> I think there was four of us at the ones [workshops] that I went to which was good, but probably a few more would have maybe helped create more discussion. There was a lot of discussions, but maybe a few more would have brought more insight as well. (UK, coach 6)

Beyond this, a number of coaches articulated that the use of the social media platform Facebook to encourage discussion and provide further resources for coaches was potentially not a suitable communication tool for the target audience (e.g., sports coaches). This can be seen in the following quote:

> If I was to go away I could go to those links and I could read those articles etc. I know that was the intent of the Facebook page. But I'm 45 and don't use Facebook… I found the Facebook site useful as a reference tool but that was probably not the purpose of the site, but that's how I use it… It's a personal thing. (Australia, coach 1)

Impact

This theme aims to examine the impact of the CoachMADE project on coaches' learning and actions. The data provided in this section comes from 18 interviews with coaches who took part in the intervention phase of the project. Using thematic analysis procedures (Braun, Clarke & Weate, 2016), codes were categorised into two subthemes (Table 26), which represented: (a) coaches' actions following their involvement in the CoachMADE project, and (b) coaches' self- reflections following their involvement in the CoachMADE project. These subthemes capture the short-term outcomes of the program. In particular, they acknowledge the behaviours of the coaches, the influence of the workshops on others (i.e., athletes), and the coaches' reflections on motivation and anti-doping. The subthemes are presented using quotes from the interviewees in order to provide insight into the impact the CoachMADE program had on their coaching practice. Moreover, this approach ensured the experience of the coaches interviewed within the process evaluation remained in the foreground.

Table 26. Impact of CoachMADE on coaches' action and learning.

Codes (this list is not exhaustive)	Subthemes	Theme
Coach applied motivation strategies to anti-doping conversations. Coach's behaviour change has an impact on parents' behaviour. Coach has been able to inform others around supplements. Coach has built rapport with his athletes. Coach has stopped taking supplements. Coaches' have begun to use autonomous-supportive behaviours outside of coaching. Coach included values in newsletter and has set up meetings with parents. Engaging athletes in doping education increased parents' awareness of club ethos. Knowledge on anti-doping can facilitate the start of conversations with the athletes. Workshop information supported coach in alternative coaching situations. Workshops gave coach confidence to talk to athletes and parents. Workshops led to ethics-related conversations with athletes. Workshops stimulate and shaped discussions around doping. Workshops had an influence on coaching practices.	Coaches' actions following their involvement in the CoachMADE project.	Impact of the CoachMADE program.
Athletes reported increased knowledge of anti-doping after coach attended anti-doping courses. Athletes responded positively to coaches changing behaviours. Coach has become more self-reflective. Coach has noticed a change in athletes' behaviour. Coach reflected on the relevance of motivation content across situations. Increased awareness of the link between doping and motivation. Increased coaches' awareness of doping related information. Increased coaches' awareness of motivation.	Coaches' self-reflections following their involvement in the CoachMADE project.	

Coaches' actions following their involvement in the CoachMADE project.

This subtheme represents the behavioural outcomes of coaches' following their involvement in the CoachMADE program. With reference to coaches' actions, the coaches discussed the way in which

they communicated with their athletes, implemented changes to their behaviour, and how their actions influenced stakeholders (e.g., parents). Specifically, coaches spoke about how the workshops had provided an opportunity for them to initiate conversations with the athletes they coached about motivation and doping. To illustrate, one coach discussed how the motivation elements of the workshops provided him with the structure to talk about doping with the athletes he coached:

> The workshops gave me the structure to talk about the motivations, intrinsic and extrinsic motivations, you know, it gave me that vocabulary. So, it [the workshop] was really more about prompting the conversation and sitting down and saying right “we are going to talk about something different today”. (UK, coach 3)

Indeed, the coaches discussed how the workshops introduced them to factors which may influence an athlete’s decision to dope and allowed them to have conversations with their athletes about this. This can be seen in the following quote, where a coach recognised and intervened in a situation which may have increased an athlete's intention to dope:

> I could see the frustration. He was training every week. He was coming down initially and just walking laps and doing running laps, and we were slowly working on changing direction etc. It was really difficult because I could see the frustrations, so I wanted to make sure I had that chat with him. I thought, “you know what, this is something that if I go further if I coach a higher team, we are trying to get this team promoted into seconds, so we’re not far off, these things could come up”. So I decided to sit down and chat to him and say “I hope you haven’t considered this to be an option, because I don’t think it is an option", and he said, “well no, I haven’t”. I said “well that’s a good thing,” he said, “well I’ve looked into what I can take legally”, I said, “well you have looked into it”. It’s hard to explain to a young bloke who wants to play, there is no quick fix. And I said to him, “there is always next year, or the year after, or the year after, so for you to make a silly mistake, and you know what, you’re

not going to get caught at that level of hockey, no one is going to drug test you, you're safe, but that's not the point. The point is it becomes habit forming, and you will do that for the rest of your life. You will take the easy option, and the easy option, and the easy option". (Australia, coach 3)

In addition to prompting coaches to have conversations about doping, following the workshops, some coaches' organised dedicated anti-doping sessions for athletes to inform them about processes such as checking medications:

> We had a little workshop where I got them to bring their phones in, they are not normally allowed their phones, and they could go and search for things [medicines]. So I put some example on the PowerPoint, and they had to research them and go on the website and know where to look, and look at [the sport]. Is it allowed? Is it not allowed? And then I went through some stuff and they had some questions about it and I recommended that they obviously go away and look at whether they are taking any medication etc. (UK, coach 6)

Notably, some coaches found that the workshops prompted conversations with their athletes around ethical issues beyond doping, such as cheating. While cheating was not discussed in the workshops, coaches appeared to make connections between ethical considerations and the topics which were covered (e.g., supplements). This is seen in the following quote:

> I was talking to a couple of them about this and specifically two things, two elements. Firstly we talked about cutting corners you know, we sort of said if you were in a race and you couldn't quite catch up with the lead group on the bikes, and you had the opportunity to take a little shortcut to get back on their wheel would you do it? "Oh god no, no, no, course I wouldn't", so well that's the analogy. So we talked about that a little bit, and then we also talked about supplements. So a little bit more nitty gritty there because not all of them but some of them, a lot of people at that level, would take supplements between and after exercise. We talked about it and I did say "go and check your batch number" and all that

> stuff, but it wasn't really about that. It was more about where is the line? Why is that acceptable but it's not acceptable to take EPO or whatever? So there was an interesting ethical conversation. (UK, coach 3)

The coaches provided a number of examples where the workshops had influenced their behaviours inside and outside the coaching environment. In the coaching environment, coaches specifically identified examples of need supportive behaviours which should promote intrinsic motivation. For instance, one coach spoke about how the information provided in the workshops changed the way he spoke to the athletes he coached: "It changed the way I addressed players. It reinforced and made sure that I was more focused on engaging and giving the boys ownership". (Australia, coach 1). A coach from Greece identified that following the workshop, he had attempted to minimise the pressuring language he was using when communicating with athletes:

> The most apparent point that I changed and I tend to think like that in my expression is the "must" or "it would be good". That's what I have truly changed regardless of the fact that I wasn't that strict and tell them that this thing must be done exactly like that and perfectly. I always have, or at least I try to have, an alternative approach, so this helps me a lot in achieving it. (Greece, coach 1)

Furthermore, one Australian coach identified an example where he acknowledged an athlete's perspective and feelings following issues surrounding training:

> I sat down with him, and he had a few concerns about training, etc. Had I not noticed that, had I just have let that go, I probably wouldn't have found that out (inaudible). I said to him, "anytime you're unhappy just come and see me". I dunno, maybe because he was on the line between the first and the second team, maybe he didn't think he had the seniority to do it. I thought well, it doesn't matter who you are, come and see me. (Australia, coach 3)

With reference to coach behaviours outside the sporting environment, one Australian coach described how his involvement in the CoachMADE program influenced the way he communicates with others outside of sport:

> The key thing is I'm more aware of the actions matching the intent. I don't think that there was ever a change in my intent, but there was definitely times where maybe the actions I took or the words I said. Now, with what I know from the motivational perspective, may not have matched the intent or were less likely to bring about the outcome I was intending. That's the biggest change. That flows on to work with colleagues, interactions with your own family, and friends. (Australia, coach 1)

Bridging the gap between their behaviours in sport (i.e., with their athletes) and outside of sport (i.e., in their life), one UK coach spoke about how the information provided in the workshop around supplements had influenced their personal consumption of certain products:

> Personally, I used to be somebody who used to use lots of supplements unknowingly and now I don't because, well, now I know more about it. I now think I am not going to buy into that. I think fundamentally that has changed because I don't want to consume it myself. I don't want to buy into that market, and it feels like a small voice at the moment against all the massive markets and the amount of commercial drive there is to produce protein. (UK, coach 6)

Turning to the influence of the coaches' actions on other stakeholders, coaches spoke about how their behaviours influenced other coaches and the parents of athletes they coach. For example, one coach discussed how the information they received in the workshop surrounding anti-doping allowed them to educate other coaches:

> Last night I was marking work for an upcoming level two course, and at the moment part of that is the nutritional approach to training. This is something that is a worry because about 80% of the candidates after training take a protein shake. Bear in mind most of them work

> with under 18s and probably don't train that much. In [sport] there is probably one GB team, and everybody else is training at the lower level, so they don't have much access to nutritionists because of the funding. So, I think it's like in the modern world because you've got protein shakes available people assume that is the right thing to have and that is a massive concern. So a lot of people put protein bars, protein shakes, that they would recommend after training and I've been able to say, "look at this website, what food can they get it from where occurs naturally? These are all the reasons why you wouldn't want to be recommending potential supplements", because the reality is unless you know it's ok don't take it, and even then, you can never guarantee. (UK, coach 6)

In the following quote, one UK coach describes how the information provided in the workshops allowed parents to reflect on the behaviours they use around their children:

> It was good for the parents in reflecting what our ethos was, and what we are doing, and why we are doing it, and it's not just about winning at any costs and fastest is best … There was one interesting post which said: "oh that's really interesting thank you, might take a bit of us old school riders to adopt that way of thinking because it's not really the way we were brought up back in the 80s sort of thing". (UK, coach 4)

Coaches' self- reflections following their involvement in the CoachMADE project.

This subtheme captures the coaches' self-reflections following their involvement in the CoachMADE program. Coaches reported positive responses from the athletes, increased awareness of motivation and doping, and found that the workshops prompted self-reflection.

With reference to increased awareness of motivation and doping, coaches spoke about how the workshops had increased their awareness and understanding of doping-related information and the topic of motivation. Coaches also described how the structure of the CoachMADE program

ensured the association between motivations and doping was clear. The coaches' increased knowledge of doping is demonstrated in the following quotes:

> Some things I didn't know at all; [for example] when an athlete is sanctioned or not, [or there might have been] a substance that is prohibited and I was not aware [of it so] I may have recommended it to my athletes. It [the program] was something very satisfactory and educating to me. (Greece, coach 6)

> It increased my awareness in the area and also gained me some tools to be aware of. Websites, how to look things up, rules, all that type of stuff. All the information was new to me, not something I was aware of, every single part of it. (Australia, coach 2)

Corroborating the coaches' increased awareness of doping, a coach spoke about how the workshops had developed his understanding of doping in sport, and explained how this had influenced the actions that he takes (i.e., interactions he has) with athletes around the topic at important times of the season, such as in the build-up to competitions or training camps:

> The anti-doping side of it has given me a lot more awareness. I knew some of the examples of what you can do to get done for doping, but I didn't realise there was that many. That's the side of things that it has educated me on, and then making sure the athletes are aware of all the areas when they go away with teams, so they are ahead of the game, rather than being put on the spot and under pressure and not being able to cope at the time. (UK, coach 2)

With regards to the coaches' increased awareness of motivation, following the workshops, coaches reported that their understanding of motivational styles and strategies increased. For example, one coach spoke about how the identification of need thwarting (i.e., red) and need supportive (i.e., green) motivational strategies was informative:

> That's certainly the CoachMADE program to me; previously I've always done it the way I've did it because that's just how I did it. We weren't trained formally the way to be a coach. The red techniques and the green techniques, especially the video it really hit home. Where you got the old school, coach yelling at the players; I've seen that go on at junior sport and I always wanted to go up to the coaches and go "what do you think you're doing, you're going to turn these kids off the game for life, and that's what's it's not about. You've got a message fine, I know you want to get it across, but it's how you do it." (Australia, coach 5)

Illustrating that the connection between motivation and doping was beneficial to coaches, one coach stated:

> In my head, I thought what we going to do was just look at anti-doping and what it was about. So I think having the motivation [element], almost thinking more of the "why do they do it?" and "what motivates them to take drugs or dope in other ways?", that really set that up. (UK, coach 2)

When reviewing the data, we identified that the workshops had prompted self-reflection for a number of coaches. In the following example, one coach discusses how across the program he had begun to think about his actions and consider alternative ways to manage difficult situations:

> I took more out of [workshop one] than I thought I did with everything else. It's a way of motivation. Even how it's put across to us, that's not just athletes and coaching, that's life in general. Having a young family you see the same things as well, to me that was fantastic. I really took something out of that. It's human nature to be on that red line. It's just the way it is and even now I still do it, when I'm involved in my coaching you get to those points, not so much the bribery but frustration takes over, and several times, dozens of times, following the course I've stepped back and thought "what do I do? How do I need to approach this differently?". I can do it: (a) in a calmer way and (b) not push my athletes… I kept a little diary for a couple of weeks afterwards. I sort of keep like a notepad I carry around with me

pretty much everywhere. I just jot notes, what I like about other teams, any scouting stuff. But a couple of times I found myself asking "why did I do this behaviour? Why did I let the frustration seep out? Why did I approach this player out of frustration?" (Australia, coach 3)

Furthermore, a UK coach describes how he reflected on the content from the workshop and then implemented it into his practice, and noted the response of the athletes he coached:

> I think they went well. I think for me it was more the first one or two weeks nothing changed in terms of behaviours I think it was more me almost reflecting on what I was already doing, it was only more towards the later weeks that I started trying to purposefully change things and manipulate my actions and seeing what the response was. But yeh I thought reflecting on that was the best way that I've learnt from it and knowing that if I do this action, this is the response I get, and then could I have actually done that a different way, could I have done that better, could I motivate them particularly in a way that gets more out of them. That for me was the prime thing I took away from all of that. (UK, coach 2)

Turning to the reactions of athletes, one UK coach described how the athletes he coached responded positively when he used a number of need supportive strategies (e.g., show warmth, care, and understanding):

> Thinking about the feedback throughout the season, one of the girls said to me, "you took the time to find out who we are outside of sport, outside of the training match environment". So that means a lot to them to show you care, show you've got that empathy kind of thing. So just more like I think someone's sister was ill and I was asking how they are, and if it's an injury, and they are away for a couple of weeks, ask them how's it going, ask what the physio has said, little bits like that which don't seem much at the time … The girls who were maybe debating about not playing next season because of work and others bits and bobs, well when you sit them down and tell them what impact they make on the team,

> and how much you appreciate the effort they have put in and stuff, and then they come back and say how much they really want to play next year, it's great. (UK, coach 1)

In addition, a Greek coach identified that the athletes he coached responded better when he used intrinsic motivational strategies: “They just show a change in my behaviour during training, I gave them options to choose from, I improved some things that I was doing wrong; their reactions were better” (Greece, coach 6). Moreover, the next quote is from a coach who suggested that the response from the athletes he coached had changed following the implementation of motivational strategies in his coaching practice:

> The way I coach is very disciplined, and I was looking at some of the red and green strategies and thinking “yeah maybe I should adjust that a little bit”, and strangely enough I have adjusted it and it has made quite a significant difference in the response that I’m getting from the swimmers. (UK, coach 5)

Although the majority of coaches suggested that athletes responded positively to the changes in the coaches’ behaviour, one Australian coach identified the importance of coaching the individual (i.e., not assuming that the same strategies can be used with every person):

> I always maintain you coach individual players. In a team sport where I have a squad of 30-odd players, some people respond differently to others. It’s always going to happen that you try and coach everyone as a group; it never works, you need to make sure you coach each individual player the way they need to be coached. That’s not just about me personally and the players personally, that’s about getting those players to perform their best. They are not going to perform their best if you are yelling and they don’t respond to it. You’re just going to get them to sulk, or you’re going to get them offside. I have players in my team that need to be yelled at. As stupid as it sounds, those blokes, when I didn’t, when I changed my behaviour to be a lot quieter, they thought, “well why aren’t you giving me a rev up”? Well, no, I want to try and be a little bit calmer and they didn’t respond well to it. I’ll be honest

with you some players just want to be told, “get out there and do that”. It’s funny because you’re making the change to be calmer and to not push them like that. These are senior players, and I explained it to them, and they said: “no, I’m quite happy for you to yell at me when I need it”. (Australia, coach 3)

Discussion

The role of the coach in doping prevention is high on the agenda of global anti-doping organisations and coaching policy. For example, the coaches’ influence on doping attitudes and behaviours is explicit in the World Anti-Doping Code (World Anti-Doping Agency, 2015; WADA) and reinforced in the International Sport Coaching Framework (International Council for Coaching Excellence and Association of Summer Olympic International Federations, 2012). In a field lacking evidence on anti-doping education effectiveness, the theory-informed CoachMADE program aimed to bridge a noticeable gap between anti-doping policy and practice.

The main findings from the process evaluation are that coaches who engaged with CoachMADE received the program as it was intended and perceived it to be a positive experience. They reported changes in their personal perceptions and behaviors within and beyond their coaching context, as well as in the perceptions and behaviors of those around them. While this evidence points to encouraging support for the CoachMADE program amongst some of the coaches, there were several challenges and difficulties in the recruitment and engagement of other coaches.

In terms of coach recruitment, while the target of recruiting 120 coaches across the three countries was met, considerable effort by the researchers was expended to meet this target. Coach recruitment difficulties are not uncommon and have previously been documented (e.g., Cushion, Armour, & Jones, 2003; Lyle, 2002). This study highlights the importance of researchers playing an active role in recruitment by personally contacting potential coaches, rather than having a passive

role by engaging in email communication alone (McCabe, 2017). However, given that recruitment difficulties remained, additional solutions are needed to inform coach-focussed anti-doping programs, such as CoachMADE, to increase the likelihood that coaches will engage in education opportunities.

Indeed, previous anti-doping research (Patterson et al., 2014; Patterson et al., 2016; Patterson & Backhouse, 2018) has shown a reluctance among coaches to engage with anti-doping activities, including education programs, and suggestions have been made to integrate anti-doping education with other topics to encourage coach engagement (Patterson et al., 2016). Having recognised the potential for low engagement among coaches, the research team integrated anti-doping information within a broader motivational communication approach (i.e., the CoachMADE intervention workshops). Findings of the process evaluation indicate that this integrated approach was to some extent successful in attracting coaches to the CoachMADE program in the first place, and aided in their retention. All of the interviewed coaches found the motivational material useful and engaging.

However, barriers to the implementation of CoachMADE were identified across Australia, Greece and the UK. Firstly, it is important to acknowledge that time and location were reported as barriers to workshop attendance. Across all three countries we attempted to minimize these potential barriers by delivering workshops at various times of the day and at coaches' sports clubs. Still, attendance at workshops was often lower than expected. Given that the majority of community sport coaches are coaching on a part-time or volunteer basis, and coaching does not generate their main source of income (North, 2009), it is not surprising that coaches' attendance at non-formal educational workshops is often limited (Nelson, Cushion & Potrac, 2006).

To address the coaches' reported lack of time to attend the workshops, the CoachMADE program could be offered to coaches in the off-season (Scherzer & Williams, 2008). This was not appropriate for this program of research as it would have limited the opportunity to evaluate the

impact of the intervention on the athletes, who are ultimately responsible for any prohibited substance found in their system (WADA, 2015). Secondly, some recreational sports coaches and athletes did not recognise the importance of anti-doping education for sport at this level. This is something that has been evidenced previously (Patterson & Backhouse, 2018) and our findings corroborate previous suggestions that more should be done to ensure that athlete support personnel, at every level of the system, acknowledge their collective responsibility to promote the importance of doping-free sport (Patterson, Backhouse, Duffy, 2016; Whitaker et al., 2014). Without such commitment from stakeholders (e.g. WADA, International Federations, National Anti-Doping Organisations, national sport governing bodies, and sport clubs), the likelihood is that coaches may not recognize the importance of anti-doping education for themselves and ignore their anti-doping responsibilities (Engelberg & Moston, 2016; Vankhadlo & Planida, 2013).

For coaches who were able to engage in the project, they reported having positive experiences. With reference to the dose delivered and received, coaches who took part in the CoachMADE intervention suggested that the two three-hour CoachMADE workshops were appropriate. Research has noted that other coach education courses are often considered too short in duration, and coaches often reported being overloaded with information (Vargas-Tonsing, 2007; Maclean & Lorimer, 2016). However, it appears that this was not the case with CoachMADE; the provision of two three-hour workshops may have supported the coaches' theoretical understanding and practical application of autonomous-supportive behaviours and anti-doping practices.

In addition to providing positive feedback on the program dose, coaches looked favourably upon the way that the workshops were delivered and the materials used in the CoachMADE workshops. Specifically, the face-to-face delivery of the workshops and the interaction on social media may have encouraged coaches to be satisfied with, and remain in, the research process. In support, research has demonstrated that enhancing participant engagement and providing regular information can promote study completion (Dziura, Post, Zhao, Fu, & Peduzzi, 2013). Interestingly,

the results that related to coaches' satisfaction suggest that each workshop – i.e., control group, intervention group workshop one and intervention group workshop two – were positively received by the coaches who took part in the research. This indicates that both forms of education were well-received by coaches. The coaches in the intervention group did, however, report greater levels of satisfaction six weeks after the second workshop than those in the control group. Furthermore, during follow-up, coaches in the intervention condition reported that the program was more relevant to their needs than coaches in the control condition. This suggests that the CoachMADE workshops were appropriately designed to meet the needs of the coaches and that the second workshop added to the coaches' satisfaction levels following the first workshop. However, other elements of overall satisfaction (i.e., interest, usefulness, and relevance) did not differ across conditions at 12 weeks.

In addition to coaches' satisfaction with the workshops, coaches reported an increase in confidence in their ability and understanding of anti-doping roles and responsibilities. Further, our questionnaire analysis indicated greater changes in experimental group coaches' self-efficacy to confront athletes regarding doping matters, compared to control group coaches. While the majority of anti-doping education targets athletes (Mazanov, Backhouse, Connor, Hemphill & Quirk, 2014), the current findings go some way to addressing the objectives of successful anti-doping education proposed by the WADA (Dvorak et al., 2014). Consequently, coach based anti-doping education can develop and support coaches' understanding of the harm caused by doping to the integrity and essence of sport. This is important, because the findings relating to program impact suggest that coaches who participated in the CoachMADE workshops reported greater self-reflection and changes to their behaviour inside and outside sport, as a result of their training. In particular, the coaches provided examples where they had used need supportive strategies in their coaching practice and outside the coaching environment. Further, the analysis of questionnaire data also indicated that coaches in the experimental condition reported greater perceived effectiveness of a

need supportive communication style than those in the control group. Thus, the workshops were seen to promote coaches understanding of how their behaviours influence athletes' values and behaviours with specific reference to anti-doping attitudes, which complements WADAs aims and objectives for targeted athlete support personnel education (WADA, 2009).

Limitations, Future Research Directions, and Conclusions

Limitations of the project include the lack of strong fidelity data (e.g., coach observations of coach-athlete discussions about doping) as to whether the coaches implemented the taught strategies with their athletes, and the reliance on self-reported data for doping use. Also, other influences on athletes' tendencies to engage in doping, besides the coach influence, such as societal pressures or organizational pressures at the sport club level were not assessed in this project. Another potential limitation of the project was that the two groups received unequal attention in terms of hours of face-to-face contact and on-line support (related to the implementation of need supportive communication). It would not have been desirable to offer similar amount of time to the control group because there is only so much factual information about anti-doping procedures and banned substances one can deliver in an engaging way in face-to-face workshops. Our 1-hour workshop for the control group reflected current anti-doping practice in the three countries. The other option would have been to cut down our motivation intervention to a 1-hour workshop and provide nothing more. However, the meta-analysis by Su and Reeve (2011) shows that SDT interventions need to be fairly extensive to be effective. Having a third group (attention control) would have also not been financially feasible given the size of the project.

In terms of the analysis of the questionnaire data of coaches and athletes, one significant limiting factor was the skewed distribution of scores. This meant that there was very little or no "room" for change in most examined variables as a result of the intervention. The reason for such skewed distributions could have been self-selection bias (e.g., coaches with strong anti-doping

views were more likely to sign up in the study; their athletes were also likely to have similar views), or social desirability (i.e., some athletes and coaches were reluctant to indicate that their views on doping were anything other than strong negative) or the young age of some of the athletes. Hence, the questionnaire data on the examined psychological variables and doping-related processes were not particularly helpful in assessing the impact of the intervention. In contrast, the coach ratings of the workshops and the intervention as a whole, as well as the interview data, offered a much richer information on the feasibility and effectiveness of CoachMADE. It would be interesting for future researchers to train anti-doping educators employed by national anti-doping agencies to deliver CoachMADE, as opposed to university researchers which was the case in our project. Such a future study will test the generalizability effects of the program.

It was not possible to interview athletes for this project. However, questionnaire data analysis of their responses indicated that there were no effects of the experimental condition on the change of any of the dependent variables. To some significant extent, this is due to the non-normal distribution of scores of most variables in the questionnaire pack (see also the next section). Another potential reason for the lack of changes was that the intervention did not target athletes directly. Future deliveries of CoachMADE could involve workshops with both coaches and athletes, delivered in club settings, to enhance the impact of the program.

In terms of country differences, the administrative error in the distribution of questionnaires in the Greek samples, limited our opportunity to examine country x time differences in the effectiveness of the intervention. Some differences amongst countries emerged but there was not a systematic pattern of effects, particularly when comparing the intention to treat and per-protocol analyses.

In conclusion, mixed findings were found with regard to the feasibility and effectiveness of the CoachMADE program. For those coaches who were able to engage with the program, they found it beneficial for themselves and for their fellow athletes and coaches. However, other

coaches were unable to sign up or stay involved throughout the duration of the program due to practical constraints, primarily lack of available time. Our findings align well with those of past research (e.g., Patterson et al., 2014) showing that engaging the coaching community in anti-doping education and practice is a challenging goal. We hope that the findings of the process evaluation and our suggestions for future research and practice will help guide the future development and implementation of CoachMADE and future anti-doping interventions.

Financial information (Note: All amounts are in USD)

Curtin University

Expense category	Budget
Travelling	2,650
Hospitality	1,480
Printing/Stationery	3,444
Salaries	100,496
Athlete incentives	2,200
Dissemination	6, 047
Overheads	20,853
Grant total	137, 170

Aristotle University of Thessaloniki

Expense category	Budget
Personnel	28.238
Travel and subsistence	1.539,60
Research materials	4.103,40
Total eligible cost	33.881
Overheads	3.387
Grand Total	37, 268

Leeds Beckett University

Expense category	Budget
Personnel	84,814.95
Travel and subsistence	936.25
Research materials	3,938.42
Total eligible cost	89,689.62
Overheads	13,406.38
Grand total	103, 096

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Appendix 1-Phase 1 Evaluation

Table 1- Australia: Workshop 1 evaluation descriptives (experimental condition) (1 ('strongly disagree') to 7 ('strongly agree'))**.**

Item	N	Minimum	Maximum	Mean	Std. Deviation
The workshop was useful for me.	5	5	7	6.4	.89
The workshop will be beneficial for my athletes.	5	5	7	6	.71
I enjoyed the workshop.	5	6	7	6.2	.45
I feel confident to use the strategies I have been taught in this workshop.	5	6	7	6.2	.45
I feel sufficiently prepared to implement the strategies I have been taught in this workshop.	5	6	7	6.2	.45
I intend to use the training tools from this workshop in my coaching	5	6	7	6.4	.55
I would recommend this workshop to other coaches.	5	6	7	6.6	.55
I valued the theoretical messages conveyed in the workshop.	5	5	7	6.2	.84

Table 2- Australia: Workshop 2 evaluation descriptives (experimental condition) (1 ('strongly disagree') to 7 ('strongly agree')).

Item	N	Minimum	Maximum	Mean	Std. Deviation
The workshop was useful for me.	5	6	7	6.4	.55
The workshop will be beneficial for my athletes.	5	5	7	6.4	.89
I enjoyed the workshop.	5	6	7	6.6	.55
I feel confident to use the strategies I have been taught in this workshop.	5	6	7	6.6	.55
I feel sufficiently prepared to implement the strategies I have been taught in this workshop.	5	5	7	6.2	.84
Following this workshop I now understand my anti-doping roles/responsibilities as a coach	5	6	7	6.8	.45
Following this workshop I am now confident to have discussions with my athletes about anti-doping issues	5	5	7	6.2	1.1
I intend to use the training tools from this workshop in my coaching	5	6	7	6.6	.55
I would recommend this workshop to other coaches.	5	6	7	6.8	.45
I valued the theoretical messages conveyed in the workshop.	5	7	7	7	.0

Table 3- Greece: Workshop 1 evaluation descriptives (experimental condition) (1 ('strongly disagree') to 7 ('strongly agree')).

Item	N	Minimum	Maximum	Mean	Std. Deviation
The workshop was useful for me.	5	6	7	6.6	.55
The workshop will be beneficial for my athletes.	5	5	7	6.2	.84
I enjoyed the workshop.	5	6	7	6.8	.45
I feel confident to use the strategies I have been taught in this workshop.	5	5	7	6	1
I feel sufficiently prepared to implement the strategies I have been taught in this workshop.	5	5	6	5.6	.55
Following this workshop I now understand my anti-doping roles/responsibilities as a coach.	5	5	7	6	.71
Following this workshop I am now confident to have discussions with my athletes about anti-doping issues.	5	6	7	6.2	.45
I intend to use the training tools from this workshop in my coaching.	5	5	7	6	.71
I would recommend this workshop to other coaches.	5	6	7	6.6	.55
I valued the theoretical messages conveyed in the workshop.	5	6	7	6.4	.55

Table 4- Greece: evaluation descriptives (control condition) (1 ('strongly disagree') to 7 ('strongly agree')).

Item	N	Minimum	Maximum	Mean	Std. Deviation
The workshop was useful for me.	7	6	7	6.29	.49
The workshop will be beneficial for my athletes.	7	6	7	6.43	.54
I enjoyed the workshop.	6	6	7	6.34	.52
I feel confident to use the strategies I have been taught in this workshop.	7	5	7	5.86	.69
I feel sufficiently prepared to implement the strategies I have been taught in this workshop.	6	4	6	4.84	.75

Following this workshop I now understand my anti-doping roles/responsibilities as a coach.	3	1	4	3	1.73
Following this workshop I am now confident to have discussions with my athletes about anti-doping issues.	3	1	4	2.34	1.53
I intend to use the training tools from this workshop in my coaching.	6	6	7	6.34	.52
I would recommend this workshop to other coaches.	6	5	7	6.34	.82
I valued the theoretical messages conveyed in the workshop.	6	6	7	6.67	.52

Table 5- UK: Workshop 1 evaluation descriptives (experimental condition) (1 ('strongly disagree') to 7 ('strongly agree')).

Item	N	Minimum	Maximum	Mean	Std. Deviation
The workshop was useful for me.	2	7	7	7	0
The workshop will be beneficial for my athletes.	2	6	7	6.5	.71
I enjoyed the workshop.	2	7	7	6	0
I feel confident to use the strategies I have been taught in this workshop.	2	5	7	6	1.41
I feel sufficiently prepared to implement the strategies I have been taught in this workshop.	2	5	7	7	1.41
I intend to use the training tools from this workshop in my coaching.	2	7	7	7	0
I would recommend this workshop to other coaches.	2	7	7	7	0
I valued the theoretical messages conveyed in the workshop.	2	7	7	7	0

Table 6- UK: Workshop 2 evaluation descriptives (experimental condition) (1 ('strongly disagree') to 7 ('strongly agree')).

Item	N	Minimum	Maximum	Mean	Std. Deviation
The workshop was useful for me.	3	5	7	6.333	1.16
The workshop will be beneficial for my athletes.	3	6	7	6.667	.58
I enjoyed the workshop.	3	5	7	6.333	1.16
I feel confident to use the strategies I have been taught in this workshop.	3	4	7	6	1.73
I feel sufficiently prepared to implement the strategies I have been taught in this workshop.	3	5	7	6.333	1.16
Following this workshop I now understand my anti-doping roles/responsibilities as a coach.	3	7	7	7	0
Following this workshop I am now confident to have discussions with my athletes about anti-doping issues.	3	5	7	6.333	1.16
I intend to use the training tools from this workshop in my coaching.	3	4	7	6	1.73
I would recommend this workshop to other coaches.	3	5	7	6.333	1.16
I valued the theoretical messages conveyed in the workshop.	3	5	7	6.333	1.16

Table 7- Australia: Workshop 1 evaluation qualitative feedback (experimental condition)

Item	N	Comments
Describe aspects of the workshop which you found to be most useful (please elaborate as needed)	5	*"the way in which the presenters used the motivation techniques in their teaching methods which created an additional layer of context. eg 'you choose one of the following scenarios...: creating a sense of autonomy eg the feedback was constructive '...well done I like how you ..." rather than just "well done"" "Enjoyed and benefitted from the role playing." "Why do you coach, What makes an effective coach, Autonomy - Relatedness – Competence, Coaches left with homework to do, I enjoyed the challenge of putting the tools into action knowing that it will be assessed in 2 weeks, Green/Red Motivation" "Small group resulted in frequent interactions with other coaches."*

Describe aspects of the workshop which you found to be least useful (please elaborate as needed)	5	*"I would be intrigued to know if the motivation strategies are different between different level coaches? ie do the high performance coaches tend to have more red motivation techniques than coaches of juniors/beginner athletes?"* *"Nothing"* *"NIL"* *"While the Motivation Barometer was a good idea, having one for 3 people resulted in a mess of post-it stickers without a clear message from this activity."* *"Introduction"*
Suggestions to improve the workshop	5	*"maybe not directly related to improving the workshop, but more about delivery of the anti doping message. In our sport we tend to get in SMA to present the ASADA anti doping material to our youth athletes - I think it would be great if they also complete the course"* *"It was all relevant and interesting."* *"1. I thought we could have got through the slides quicker.* *2. I felt the coaches could follow the information that was provided on the slide.* *3. Could the example of soccer "key note" be done with a video example? easier to understand."* *"More emphasis on individual sports as most of the examples and scenarios where related to team sports. "* *"Less introduction and more practical. The more the participants can talk through ideas and scenarios the more they will take from it. "*

Table 8- Australia: Workshop 2 evaluation qualitative feedback (experimental condition)

Item	N	Comments
Describe aspects of the workshop which you found to be most useful (please elaborate as needed)	5	*"I liked the group activities. It created discussion within."* *"green/red strategy, role play"* *"Background very good and can apply to many different areas as a coach/parent/teacher and can then apply to anti-doping"* *"red and green strategy, group discussions"* *"green/red strategies clear and concise solutions for anticipated problems"* *"the role playing"*
Describe aspects of the workshop which you found to be least useful (please elaborate as needed)	1	*"All relevant"*
Suggestions to improve the workshop	4	*"fill out worksheet throughout presentation "* *"The online support would be great between sessions "* *"Do you need something here to identify at risk athletes and*

		*then how to use green strategy to deal with it.*traits of at risk athletes "* *"i think that showing two coaching styles (not just one as in the first session) and asking people which one they feel is better"*

Table 9- Greece: Workshop 1 qualitative feedback (experimental condition)

Item	N	Comments
Describe aspects of the workshop which you found to be most useful (please elaborate as needed)	3	*"green motives- antidoping"* *"use and analysis of green motives"* *"doping information- links to the internet"* *"red and green motives"* *"communication practices"* *"red and green motives"*
Describe aspects of the workshop which you found to be least useful (please elaborate as needed)	1	*"motives do not always match what is going on in reality"*
Suggestions to improve the workshop	2	*"adjust to reality"* *"use more examples for better understanding"*

Table 10- Greece: Workshop 1 qualitative feedback (control condition)

Item	N	Comments
Describe aspects of the workshop which you found to be most useful (please elaborate as needed)	3	*Important to receive internet links related to doping* *Covers most aspect related to doping* *Discussion on the definition of doping (not only substance abuse)* *The use of role playing and the provision of safe alternatives*
Describe aspects of the workshop which you found to be least useful (please elaborate as needed)	1	*The sites in Greek are not easily accessible and informative, especially the ESKAN one*
Suggestions to improve the workshop	2	*More information on doping control procedures* *More information on prohibited substances* *More examples of doping situations that can occur during the training process*

Table 11- UK: Workshop 1 qualitative feedback (experimental condition)

Item	N	Comments
Describe aspects of the workshop which you found to be most useful (please elaborate as needed)	2	*"Clear structured recommended approach of red/green [motivational strategies] and research backed"* *"Discussions around motivation, identifying different forms"*
Describe aspects of the workshop which you found to be least useful (please elaborate as needed)	2	*"none"* *"more people to contribute would make for a better exchange of ideas"*
Suggestions to improve the workshop	1	*"context (coaching/sport culture [and] a list of, or short explanations of research that supports the material"*

Table 12- UK: Workshop 2 qualitative feedback (experimental condition)

Item	N	Comments
Describe aspects of the workshop which you found to be most useful (please elaborate as needed)	2	*"practical tools to use- GlobalDRO/Informed sport. Green/Red strategies concept for motivations"* *"website links I can send athletes to and strategies"*
Describe aspects of the workshop which you found to be least useful (please elaborate as needed)	1	*"[the workshop] was too long"*
Suggestions to improve the workshop	3	*"not as much time spent on it"* *"wide range of products (pre-checked on websites). Maybe get coaches to place products (blindly) along a continuum from probably banned and risky, to probably clean and low risk and then reveal to see if any were surprising"* *"talk about personal experiences"*

Appendix 2-All questionnaires used in the project

Baseline questionnaire for athletes

CoachMADE –athlete

To help us track your responses throughout the project we need to create a unique alphanumeric code for you. This code will help keep your data anonymous.

Please complete the questions below.

Date of birth	*DDMMYYYY*
Number of older siblings	*00*
First and last name initials	*XX*

Section A.

Each coach has a different coaching style and no one style is necessarily better than another. The following statements relate to your general experiences with your **main coach over the last 4 weeks**.

Please indicate how much you agree or disagree with each statement by **circling one number per statement**.

Over the last 4 weeks, my coach…	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
1. Gave me the freedom to make my own choices.	1	2	3	4	5	6	7
2. Supported my decisions.	1	2	3	4	5	6	7
3. Supported the choices that I made for myself.	1	2	3	4	5	6	7
4. Encouraged me to make my own decisions.	1	2	3	4	5	6	7
5. Put pressure on me to do things their way.	1	2	3	4	5	6	7
6. Imposed their opinions on me.	1	2	3	4	5	6	7
7. Put pressure on me to adopt certain behaviours.	1	2	3	4	5	6	7
8. Limited my choices.	1	2	3	4	5	6	7
9. Encouraged me to improve my skills.	1	2	3	4	5	6	7
10. Provided valuable feedback.	1	2	3	4	5	6	7
11. Acknowledged my ability to achieve my goals.	1	2	3	4	5	6	7
12. Told me that I could accomplish things.	1	2	3	4	5	6	7
13. Pointed out that I was likely to fail.	1	2	3	4	5	6	7
14. Gave me the message that I am incompetent.	1	2	3	4	5	6	7
15. Doubted my capacity to improve.	1	2	3	4	5	6	7
16. Questioned my ability to overcome challenges.	1	2	3	4	5	6	7
17. Was interested in what I did.	1	2	3	4	5	6	7
18. Has taken the time to get to know me.	1	2	3	4	5	6	7
19. Has honestly enjoyed spending time with me.	1	2	3	4	5	6	7

20. Has related to me.	1	2	3	4	5	6	7
21. Has not comforted me when I was feeling low.	1	2	3	4	5	6	7
22. Was distant when we spent time together.	1	2	3	4	5	6	7
23. Did not connect with me.	1	2	3	4	5	6	7
24. Did not care about me.	1	2	3	4	5	6	7

Section B.

Part 1. Using the scale below (1 – not at all willing to 7 – extremely willing), please answer each question by circling one number that reflects your level of willingness.

Would you be willing to use a banned substance if you:

	Not at all willing						Extremely willing
1. Increased your chances to gain a professional contract or funding	1	2	3	4	5	6	7
2. Have been heavily underperforming	1	2	3	4	5	6	7
3. Suffered an injury and needed to recover quickly	1	2	3	4	5	6	7
4. Thought everyone you were competing against was using a banned substance and getting away with it	1	2	3	4	5	6	7
5. Were struggling to keep up in training/competition with those around you	1	2	3	4	5	6	7
6. Were told that you needed to bulk up because all the other players were much bigger and stronger than you	1	2	3	4	5	6	7
7. Were offered them by someone you trusted (e.g., coach, friend, team mate, family member)	1	2	3	4	5	6	7
8. Increased your chances of getting selected for the team	1	2	3	4	5	6	7
9. Became more attractive to others	1	2	3	4	5	6	7

Part 2. Please indicate how much you agree or disagree with each statement by **circling one number per statement**.

	Strongly disagree	disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
1. Doping is alright because it helps your team	1	2	3	4	5	6	7
2. Doping is just a way to "maximize your potential"	1	2	3	4	5	6	7
3. Compared to the illegal things people do in everyday life, doping in sport is not very serious	1	2	3	4	5	6	7
4. Players cannot be blamed for doping if their teammates pressure them to do it	1	2	3	4	5	6	7
5. A player should not be blamed for doping if everyone on the team is doing it	1	2	3	4	5	6	7
6. Doping does not really hurt anyone	1	2	3	4	5	6	7

Section C.

Part 1. Circle one number on each of the rows below which best represents how you feel about doping in sport.

Please circle one number per row.

How do you feel about doping in sport?								
Bad	1	2	3	4	5	6	7	Good
Useless	1	2	3	4	5	6	7	Useful
Harmful	1	2	3	4	5	6	7	Beneficial
Unethical	1	2	3	4	5	6	7	Ethical
Unsafe	1	2	3	4	5	6	7	Safe
Unhealthy	1	2	3	4	5	6	7	Healthy
Wrong	1	2	3	4	5	6	7	Right
Unacceptable	1	2	3	4	5	6	7	Acceptable

Part 2. Using the scale below (1 – No confidence to 7 – Complete confidence), please indicate to what extent you would be **confident that you would not use a banned substances.**

How confident would you be that you could **resist the temptation** to use banned substances even if…?

	No confidence						Complete confidence
1. Your teammates or other competitors were using these substances?	1	2	3	4	5	6	7
2. This would mean you lose your place in the team?	1	2	3	4	5	6	7
3. Your team captain was the one asking you to do so?	1	2	3	4	5	6	7
4. Your coach was the one asking you to do so?	1	2	3	4	5	6	7
5. You realised that your teammates were better than you because of doping?	1	2	3	4	5	6	7
6. You thought that it was the only way to help your team to succeed?	1	2	3	4	5	6	7

Section D.

Below we list a number of substances and products. The list includes a mix of substances which are permitted and banned in sport.

Thinking about the past 12 months, have you used any of the following substances, or products which contain these substances, without a prescription? Please select all that apply			
1. Protein and BCAA supplements (e.g. whey protein powders)	Yes	Never	Not sure
2. Vitamin and mineral supplements (e.g. Vitamin C; B vitamins; Omega 3 Fatty Acids; magnesium etc.)	Yes	Never	Not sure
3. Growth hormone or IGF-1	Yes	Never	Not sure
4. Glutamine	Yes	Never	Not sure
5. Creatine	Yes	Never	Not sure
6. Erythropoietin (EPO) and relevant substances (e.g. CERA)	Yes	Never	Not sure
7. Herbal supplements to boost testosterone (e.gTribulus, ZMA)	Yes	Never	Not sure
8. Anabolic steroids (e.g. testosterone; clostebol; DHEA; nandrolone; stanozolol; clenbuterol; SARMs)	Yes	Never	Not sure
9. Caffeine and caffeinated supplements for sporting performance. (e.g. caffeine tablets, red bull etc.) *Do not include caffeinated drinks not consumed for sport performance*	Yes	Never	Not sure
10. Supplements specifically for weight loss and fat burning	Yes	Never	Not sure
11. Cocaine, heroin, methamphetamines (inc. crystal meth, ice etc.)	Yes	Never	Not sure
12. Supplements containing beetroot (e.g. Beet-it)	Yes	Never	Not sure
13. Cannabis (i.e. marijuana, weed etc.)	Yes	Never	Not sure
Please list the names of the supplements/products you have specifically used to enhance your training and/or			

performance, over the last 12 months:

Section E.

Part 1. Please circle one answer (YES or NO) for each of the statements below.

Over the last 4 weeks I have…		
1. Asked for anti-doping information/advice from other athletes in my team.	Yes	No
2. Checked if my supplements, food and/or drinks contain banned substances.	Yes	No
3. Asked for anti-doping information/advice from my coach.	Yes	No
4. Checked if my medications contain banned substances.	Yes	No
5. Asked for anti-doping information/advice from sport science support staff or medical professionals.	Yes	No
6. Tried to find information about banned substances/ methods from anti-doping sources (e.g. WADA, ASADA)	Yes	No

Part 2. Quiz: We'd like you to complete this quick quiz to find out how much you know about current anti-doping practice?

1. If a nutritional supplement is bought from the pharmacy (over-the-counter), it will not contain a banned substance	True	False	I Don't Know
2. If a nutritional supplement contains a banned substance, it will always say so on the label	True	False	I Don't Know
3. An athlete can be sanctioned after taking a supplement that they did not know contained a banned substance	True	False	I Don't Know
4. My National Anti-Doping Organisation has a list of supplements that are 100% guaranteed to be free from banned substances	True	False	I Don't Know
5. As an athlete aged 14-18 years, I can be asked to provide a urine	True	False	I Don't Know

sample for drug testing, providing parental consent is in place			
6. Athletes can be sanctioned only if they return a positive urine test	True	False	I Don't Know

Section F.

My experiences with my team. The following statements relate to the general experiences you have had whilst playing and competing with **this team over the last 4 weeks**.

Please indicate how much you agree or disagree with each statement by **circling one number per statement.**

Over the last 4 weeks, in my sport…	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
1. I felt that I participated because I wanted to.	1	2	3	4	5	6	7
2. I was satisfied with what I could achieve.	1	2	3	4	5	6	7
3. I felt supported.	1	2	3	4	5	6	7
4. I had some choice in what I wanted to do.	1	2	3	4	5	6	7
5. I felt pretty competent.	1	2	3	4	5	6	7
6. I felt understood.	1	2	3	4	5	6	7
7. I had a say regarding what skills I want to practice.	1	2	3	4	5	6	7
8. I performed pretty well.	1	2	3	4	5	6	7
9. I felt others listened to my opinion.	1	2	3	4	5	6	7
10. I had freedom to make choices.	1	2	3	4	5	6	7
11. I thought “I am pretty good at my sport”.	1	2	3	4	5	6	7
12. I felt valued.	1	2	3	4	5	6	7
13. I was able to decide which activities I wanted to practice.	1	2	3	4	5	6	7
14. I mastered new skills.	1	2	3	4	5	6	7
15. I felt accepted by others.	1	2	3	4	5	6	7
16. I felt prevented from making choices about the way I train.	1	2	3	4	5	6	7
17. There were situations where I was made to feel inadequate.	1	2	3	4	5	6	7
18. I felt pushed to behave in certain ways.	1	2	3	4	5	6	7
19. I felt rejected by those around me.	1	2	3	4	5	6	7
20. I felt forced to follow training decisions made for me.	1	2	3	4	5	6	7
21. I felt inadequate because I was not given opportunities to fulfil my potential.	1	2	3	4	5	6	7
22. I felt under pressure to agree with the training regime I was provided.	1	2	3	4	5	6	7
23. I felt others were dismissive of me.	1	2	3	4	5	6	7
24. Situations occurred in which I was made to feel incapable.	1	2	3	4	5	6	7
25. I felt other people disliked me.	1	2	3	4	5	6	7
26. There were times when I was told things that made me feel incompetent.	1	2	3	4	5	6	7
27. I felt that other people were envious when I achieved success.	1	2	3	4	5	6	7

Details about you and your team.

To help us with our analysis we need to know a little bit about you and your coaching background. As with all your responses the information you provide here is confidential and will only be used to help our team analyse the data. We will not be able to identify you and we will not share the information you provide with your club.

1. What gender do you identify with? *[circle one]*	Male	Female	Transgender	I'd rather not say

2. What is your ethnicity? *[please tick one]*		
o Aboriginal and Torres Strait Islander	o Irish	o North American
o Arab	o Japanese	o Pacific Islander
o Australian	o Melanesian and Papuan	o Polynesian
o British	o Micronesian	o South African
o Chinese	o New Zealand	o I'd rather not say
o European	o North African	
o Other not listed [please specify]:		

3. What is the name of your club?	
4. What is the name of your team? (e.g. team name/number/division)	
5. On average, how many hours per week do you train with this team?	
6. What is the name of your main coach?	
7. How long have you been coached by your main coach?	
8. Please name any other people who coach you regularly	
9. How often do you compete against other athletes/teams? (e.g. weekly league competition)	
10. What is the highest level of competition you have competed at in your sport? (not necessarily as part of this club/team)	

11. Please list any other sport(s) you participate in:

Thank you for completing this survey

Coach Baseline Questionnaire

CoachMADE - coach

To help us track your responses throughout the project we need to create a unique alphanumeric code for you. This code will help keep your data anonymous.

Please complete the questions below.

Date of birth	*DDMMYYYY*
Number of older siblings	*00*
First and last name initials	*XX*

Section A.

Doping in sport is the deliberate or inadvertent use by an athlete of a substance or method banned by the World Anti-Doping Agency. The questions in this section are about your thoughts on doping.

Please indicate the extent to which you agree or disagree with the following statements by selecting the appropriate response:

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
1. Doping is alright because it helps your team	1	2	3	4	5	6	7
2. Doping is just a way to "maximize your potential"	1	2	3	4	5	6	7
3. Compared to the illegal things people do in everyday life, doping in sport is not very serious	1	2	3	4	5	6	7
4. Players cannot be blamed for doping if their teammates pressure them to do it	1	2	3	4	5	6	7
5. A player should not be blamed for doping if everyone on the team is doing it	1	2	3	4	5	6	7
6. Doping does not really hurt anyone	1	2	3	4	5	6	7

Part 2. Circle one number on each of the rows below which best represents how you feel about doping in sport.

Please circle one number per row.

How do you feel about doping in sport?								
Bad	1	2	3	4	5	6	7	Good
Useless	1	2	3	4	5	6	7	Useful
Harmful	1	2	3	4	5	6	7	Beneficial
Unethical	1	2	3	4	5	6	7	Ethical
Unsafe	1	2	3	4	5	6	7	Safe
Unhealthy	1	2	3	4	5	6	7	Healthy
Wrong	1	2	3	4	5	6	7	Right
Unacceptable	1	2	3	4	5	6	7	Acceptable

Section B.

Part 1. We would like you to imagine that you suspected an athlete in your team has used a banned substance.

Please circle the **% that reflects your level of confidence in** each situation below.

Q. As a coach how confident are you in your ability to...

1. Approach an athlete if they break an anti-doping rule?												
	No confidence	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Complete confidence
2. Seek confirmation from an athlete you suspect has used a banned substance or method?												
	No confidence	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Complete confidence
3. Discuss banned substances and methods with an athlete?												
	No confidence	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Complete confidence
4. Communicate anti-doping rule violations and sanctions related to the use of banned substances and methods with an athlete?												
	No confidence	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Complete confidence
5. Communicate the health-related issues associated with using banned substances with an athlete?												
	No confidence	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Complete confidence
6. Discuss the ethical issues associated with banned substances and methods with an athlete?												
	No confidence	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Complete confidence
7. Find adequate time needed to discuss the use of banned substances and methods with an athlete?												
	No confidence	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Complete confidence

Part 2. *W*hich of the following communications styles do you think would be more effective in dealing with a situation where you might suspect an athlete in your team has used a banned substance?

Please select one response per row

	Very ineffective	Mainly ineffective	Somewhat ineffective	Neither effective/ ineffective	Somewhat effective	Mainly effective	Very effective
1. Impose rules with no explanations	1	2	3	4	5	6	7
2. Taking time to listen and be responsive to the athlete	1	2	3	4	5	6	7
3. Using commands ("must", "should", "got to")	1	2	3	4	5	6	7
4. Giving detailed and relevant explanations to the athlete	1	2	3	4	5	6	7
5. Criticising and devaluing the athlete	1	2	3	4	5	6	7
6. Acknowledging the athlete's negative feelings	1	2	3	4	5	6	7
7. Threatening to punish the athlete	1	2	3	4	5	6	7
8. Demonstrating affection and care	1	2	3	4	5	6	7
9. Making the athlete feel guilty and ashamed	1	2	3	4	5	6	7
10. Appearing dominating, and staying distant from the athlete	1	2	3	4	5	6	7

Section C.

The following items refer to creating an anti-doping atmosphere within your team, irrespective of whether you suspect athletes of using banned substances or methods.

Please circle the **% that reflects your level of confidence in** each situation below.

Q. How confident are you to…?											
1. Foster anti-doping attitudes among your athletes?											
No confidence	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100% Complete confidence
2. Create a culture within your athletes in which doping is not valued?											
No confidence	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100% Complete confidence
3. Foster the understanding within your athletes that they can succeed without using banned substances?											
No confidence	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100% Complete confidence
4. Promote the value of performance enhancement via personal effort, rather than doping?											
No confidence	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100% Complete confidence

Section D.

Part 1. Please read each of the statements below and circle your response (Yes/No)

Over the last 4 weeks I have encouraged my athlete(s) to…		
1. Seek anti-doping information/advice from other athletes in their team.	Yes	No
2. Check if their supplements, food and/or drinks contain banned substances.	Yes	No
3. Seek anti-doping information/advice from me or other coaches.	Yes	No
4. Check if their medications contain banned substances.	Yes	No
5. Seek anti-doping information/advice from sport science support staff or medical professionals.	Yes	No
6. Seek information about banned substances/ methods from anti-doping sources (e.g. WADA, ASADA).	Yes	No

Part 2. Quiz: We'd like you to complete this quick quiz to find out how much you know about current anti-doping practice?

7. If a nutritional supplement is bought from the pharmacy (over-the-counter), it will not contain a banned substance	True	False	I Don't Know
8. If a nutritional supplement contains a banned substance, it will always say so on the label	True	False	I Don't Know
9. An athlete can be sanctioned after taking a supplement that they did not know contained a banned substance	True	False	I Don't Know
10. My National Anti-Doping Organisation has a list of supplements that are 100% guaranteed to be free from banned substances	True	False	I Don't Know
11. Adolescent athletes, aged 14-18 years, can be asked to provide a urine sample for drug testing, provided parental consent is in place	True	False	I Don't Know
12. Only athletes can be sanctioned for committing an anti-doping rule violation	True	False	I Don't Know

Details about your coaching history and the team you coach.

To help us with our analysis we need to know a little bit about you and your coaching background. As with all your responses the information you provide here is confidential and will only be used to help our team analyse the data. We will not be able to identify you and we will not share the information you provide with your club.

12. What gender do you identify with? *[select one]*	Male	Female	Transgender	I'd rather not say

13. What is your ethnicity (please tick one)? *[select one]*

o Aboriginal and Torres Strait Islander	o Irish	o North American
o Arab	o Japanese	o Pacific Islander
o Australian	o Melanesian and Papuan	o Polynesian
o British	o Micronesian	o South African
o Chinese	o New Zealand	o I'd rather not say
o European	o North African	o Other not listed (please specify):

14. What team do you currently coach?	
15. How many years have you been coaching your current team?	Years, Months
16. How many years have you been coaching in this sport?	Years, Months
17. On average, how many hours per week do you spend coaching your current team?	Hours per week

18. What level is the team you are currently coaching?

19. What coaching qualifications do you have? (please give full name and awarding body)

20. Have you previously received anti-doping education? If yes, please provide information on when you attended, approx. how long was the session and what organisation delivered it?

21. Please select any other sports which you currently, or have previously coached:

22. How many years have you been involved in coaching altogether? (including other sports and teams if applicable)	Years

Thank you for completing this survey

Appendix 3- Interview guide used for the process evaluation.

Motivation and doping in sport
Interview Guide: Coaches

Interview Information			
Date			
Interviewer			
Time Start		Time End	
Participant ID			
Gender			

TURN ON AUDIO & VIDEO RECORDERS

Section # 1: Introduction

Hi, my name is XXXX XXXX and I am part of the team of researchers at Curtin University working on the recent project we have been running in collaboration with the International Olympic Committee. Thank you for indicating that you would be willing to participate in this interview. The purpose of this interview is to understand more about your experiences of participating in the motivation and doping in sport project and the training that you received. There are no right or wrong answers. All points of view are important. What to say, how to say it, and how much you want to say is up to you. You should not worry about what you are expected to say, or whether you are on the right track. So that we do not miss any of your comments, I would like to record our discussion. I have asked your permission to do this, as it will make our research work much easier. I should point out that your contribution will be anonymous and kept confidential, and that any published research that might result from such discussions will not contain your name.

Our discussion will last for approximately 30 minutes.

Section 2: About your experiences of the training

1. Can you describe your experiences of the training you received?
   [Probes: Which parts of the training did you do? How did you feel about each of those?]
2. Thinking about the different parts of the training that you did, did your thoughts and feelings about them change over time? If so, how?
3. Prior to receiving the training, did you have any reservations about the training? If so, what were they?
4. In what ways did these reservations change, once you received the training? [Probe: were the reservations strengthened over time, or did they decrease or disappear?]
5. Throughout the training you were provided with a variety of information materials and exercises to help you in implementing the strategies. These include the workshop materials, rich

descriptions of the strategies, action plans and facebook group. Which materials did you use the most? Why?

6. Which materials did you use the least? Why?
7. How do you feel about the content in each of the workshops? Probe: would you have liked a different format or content? If so, what would it be?

Section 3: Your coaching style

8. Has your coaching style and the way in which you try to motivate your athletes changed as a result of the training? If yes, can you provide some examples?
   [Probes: What do you do differently? What do you say differently?]
9. In relation to the examples given in the previous question - Why did you change these aspects of your coaching style in these ways?
10. Is there anything raised in the course that you decided not to do, i.e., that you felt couldn't be easily integrated with your coaching style? If so, what and why?
11. Did you find any of specific strategies that you were taught particularly challenging to implement during your coaching sessions? Which? Why do you think that was the case? How did you deal with those challenges?

Section 4: Value of the training

12. Do you feel that you have changed in any way (as a coach or as an individual more generally) as a result of being involved in the training? If so, how?
13. Can you give any examples of interactions with you athletes which highlight the value of the training in terms of its impact on the athletes?
14. How important do you think it is that other coaches get this training?
    [Probe: why?]
15. Looking back, what do you think were particular strengths of the training?
16. How do you think the training could be improved for the future?
17. Compared to other training courses you have attended, how valuable do you think this training is? [Probes: why do you think it is more valuable/less valuable/rated the same?]
18. How do you think this training course could improve your (or other coaches) quality of coaching?
19. What could be done differently in the future to attract more coaches to take part in the training?

Section 5: Summary and close

We have talked about a number of topics today. Is there anything you would like to add that hasn't come up so far?

Many thanks for participating in this interview.

End

Note. Due to the semi-structured format of the interview, some questions plus their order may change