

Using the Sport Drug Control Model to Review the Social Science Research on Doping and Identify Areas for Future Research

**Report to WADA Education Committee and Social Science Research
Ad Hoc Sub-Committee**

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1. INTRODUCTION AND OBJECTIVES

The WADA (World Anti-Doping Agency) Education Committee is seeking to target its Social Science Research Program to areas that would have greatest return in terms of enhancing the effectiveness of anti-doping education interventions. The objective of this project was to use the Sport Drug Control Model framework (SDCM; Donovan et al., 2002) to establish priorities for future social science research by reviewing what research has been completed in each of the model's domains and identifying where more research is needed. The primary required outcome was the list of recommendations rather than the review per se.

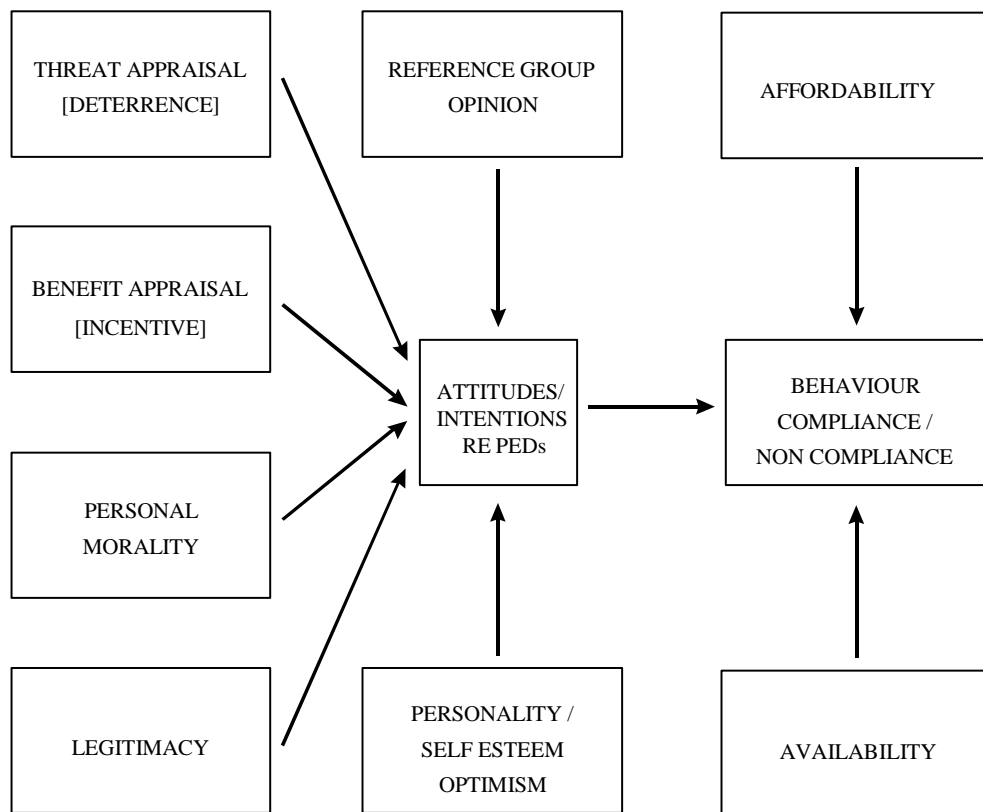
1.1 The Sport Drug Control Model (SDCM)

The Sport Drug Control Model was developed in the late 1990s (Donovan and Egger, 1997) for the Australian Sport Drug Agency (ASDA as it was then known; now ASADA: Australian Sport Anti-Doping Agency) as part of their preparation for the Sydney Olympics. The SDCM was based on cognitive decision models from social psychology, principles of public health communication and behaviour change campaigns, and the then limited research on athletes' attitudes towards and use of banned performance enhancing substances. The overall model (see Figure 1) incorporates personal morality and legitimacy from the legal model, potentially relevant personality factors, and elements such as threat appraisal, non-compliance benefit appraisal and reference group influences that are common or specific to various cognitive decision models (e.g., Protection Motivation Theory; the Health Belief Model; Fishbein's Theory of Reasoned Action; Ajzen's Theory of Planned Behaviour; etc).

The model shows six major social/cognitive inputs to the athlete's decision with respect to drug usage, all of which, but to varying degrees, are subject to modification via various intervention strategies (e.g., media messages and threat appraisal; one-on-one counselling for self-esteem enhancement; etc). The model also included two 'market factors': availability and affordability.

While the model's primary focus was on athletes, it was stated that the model could be adapted and applied to assessing coaches', trainers' and others' attitudes towards and use of doping.

Figure 1: Sport Drug Control Model (Donovan et al., 2002)



It was noted that the model can be applied in a general sense (i.e., predictive of drug use overall) and to specific contexts (i.e., predictive of drug use for various stages or events in an athlete’s career). That is, the threat appraisal can vary by competition versus out-of-competition times; the benefits of drug use appraisal can vary by whether the athlete is pre-peak or post-peak performing; and so on. Hence it is important that items for questionnaires for different groups and contexts be developed so that the construct is retained, but the questionnaire items are specific to the context.

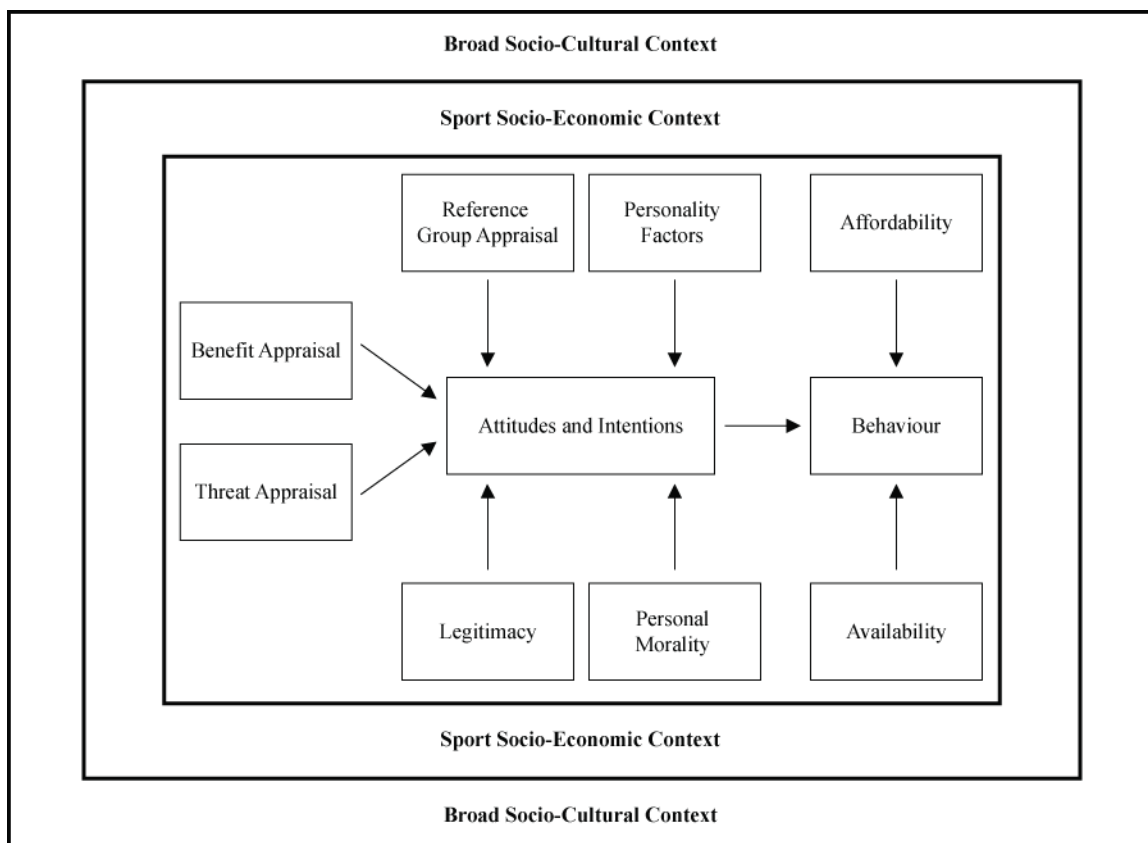
The original model also included reference to the potential efficacy of three communication strategies (education; media advertising and publicity; and visibility of personnel and test operations at events and out of competition) to influence these components (for example, the higher the visibility, the greater the appraised threat; the greater the publicity about the detection and penalising of drug users, the greater perceived effectiveness and hence legitimacy of the enforcement agency; etc).

The SDCM authors also stated that the relative importance of the various domains may vary by athlete demographics, level and type of sport, situational circumstances and national culture.

1.2 The Sport Drug Control Model Revised (Donovan, 2009)

The SDCM was extended in a 2009 publication to more specifically acknowledge the importance of broader sporting and societal forces that impact on individuals' beliefs, attitudes and values within a doping context (see Figures 2 and 3). The extended model specifically states that interventions are necessary at these broader levels, not just at the level of targeting individual athletes (Figure 3).

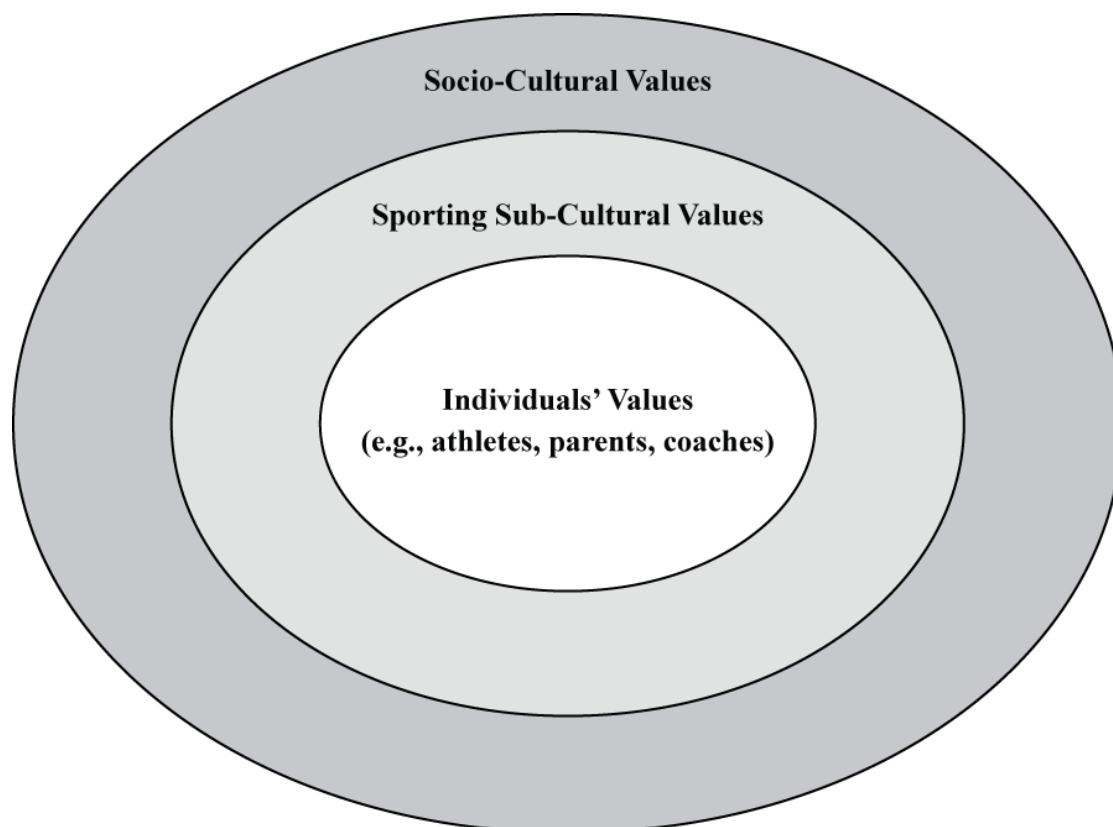
Figure 2: Extended SDCM (Donovan, 2009)



In particular the extended model includes broad societal and sport factors such as cultural differences between countries and sub populations within countries (e.g., individualism vs collectivism), the medicalisation of society in general, cosmetic and cognitive enhancement

in general, the use of illicit recreational drugs, globalisation in general and the media and sport in particular, the increasing commercialisation of sport, including the Olympics, scientism in sport and the intensification of sporting schedules. We would also add now the move from not just a market economy but to a market society (i.e., an increasing tendency to place monetary values on things previously valued for their own sake). These factors will be elaborated below.

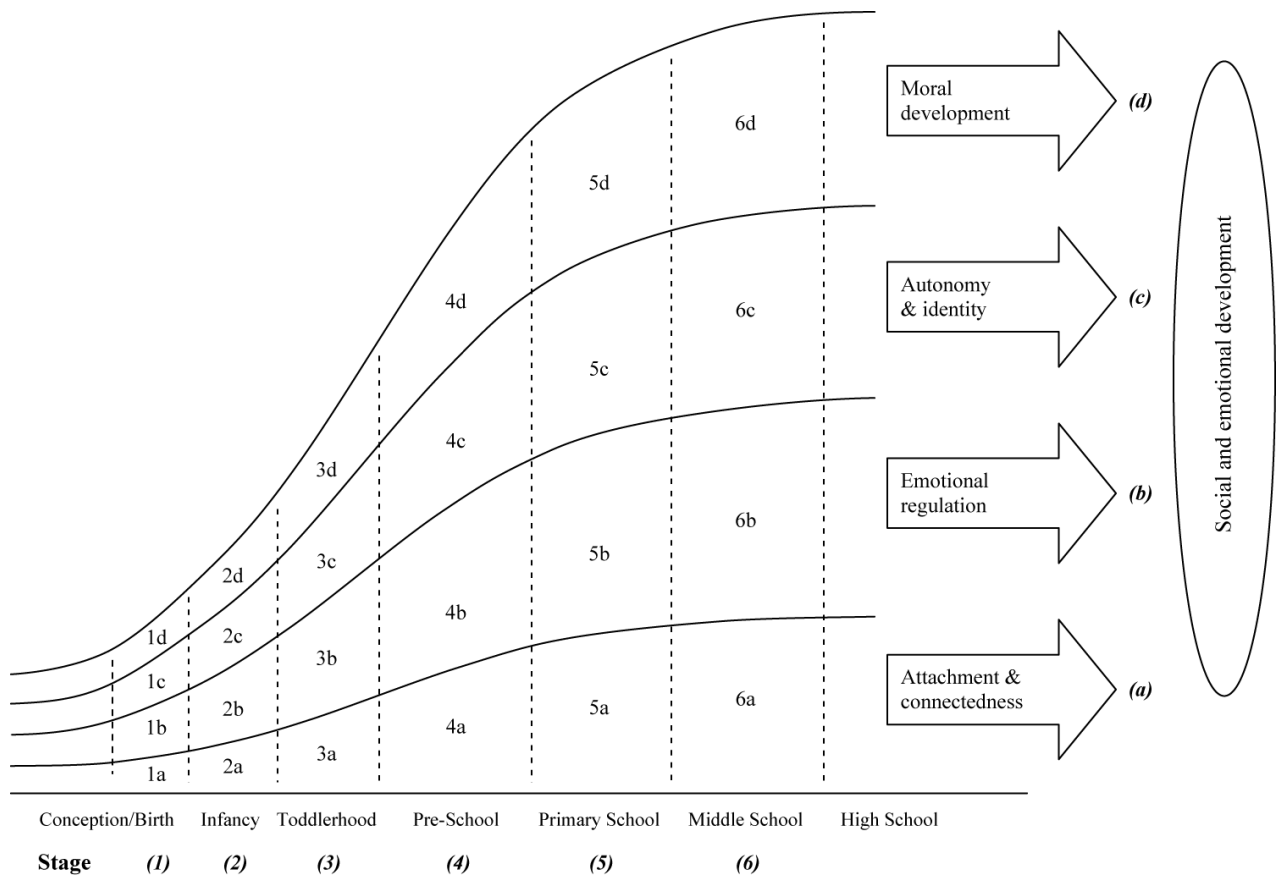
Figure 3 Extended model intervention levels (Donovan, 2009)



Although the original model stated that the relative influence of the various factors would vary by athlete's age and stage, the extended model specifically referred to socio-emotional development pathways (see Figure 4). Acknowledging this from another perspective, a recent essay by Johnson (unpublished) reminds us that many young people's myelination of neural pathways, and hence areas of the brain to do with impulse control, empathy, and self-regulation, are not complete until around the age of 25. As Rob Koehler pointed out, this implies that values and other education should continue into this age range, rather than

assume that little can be done past 18 years. The implications for research include how these interventions might differ for older versus younger athletes.

Figure 4: Socio-emotional development (Donovan, 2009)



Since publication of the SDCM in 2002 there has been substantial social science research in doping (with much of that in recent years stimulated and funded by WADA’s Social Science Research grants program). Hence this review not only looked at what we now know – and would like to know more about – in each of the original domains, but also whether the research identified additional domains relevant to athletes’ decisions to dope or not to dope. For example, at that time the SDCM mentioned but discounted the importance of response-efficacy and self-efficacy components (i.e., Protection Motivation Theory’s coping appraisal), because the recommended behaviour (i.e., non-drug use), on the assumption of zero false positives, clearly averts the negative consequences of drug use (response efficacy). Similarly, given non-addictive drugs and freedom of choice (i.e., the athlete is not being coerced into drug use), the individual’s ability to refrain from using drugs is clearly under volitional control. At that time it was stated that ‘a coping appraisal can be added to the

model to accommodate variations such as those stated.’ Given the now known pressures on some athletes to dope, an additional efficacy domain (related to Perceived Behavioural Control; TBC) is now incorporated in the model as a result of this review.

2. METHODS

Given the time constraints for conducting the review (March 10th to 31st), we conducted a brief literature search to identify recent studies which were not included in Ntoumanis et al’s (2013) meta-analysis of the social science research on doping in sport. We primarily relied on the Web of Science databases and Google Scholar (particularly for “in press” manuscripts) using a combination of keywords integrating the subject (e.g., doping, performance enhancing drugs) and the specific components of the SDCM (e.g., morality, personality). We also relied on established social science doping researchers whom we invited by email to provide us with “in press” or unpublished information that was relevant to our review, and on our own reviews of various components of the literature for our research publications in the social science of doping.

3. RESULTS

The literature reviewed is summarised in Tables 1 to 13. Only key or illustrative articles are cited in the text. Given a number of articles appear in more than one Table, a unique Reference list is also attached.

We first comment on the overall appropriateness of the SDCM as a framework for social science research in doping, and the dependent variable measures related to doping. A summary of some notable findings under each of the domains is then presented.

It can be noted that the vast majority of the research findings are derived from cross-sectional surveys or individual or group interviews and are therefore limited to interpretations of associations between variables rather than cause and effect sequences. Similarly, there are few intervention evaluation research studies, perhaps not surprisingly because such studies are expensive and many academic researchers focus on basic knowledge research anyway.

3.1 Comment on Overall Utility of the SDCM (Table 1)

Since publication of the SDCM, a wide variety of research has confirmed the relevance of each of the original domains in predicting attitudes towards and engagement in doping. Most of these studies have looked at only one or a sub-set of the domains. However, as detailed in Table 1, there have been two studies in which most (Gucciardi et al., 2011) or all (Jalleh et al., in press) of the SDCM components have been examined with single source data. Both studies were conducted with elite Australian athletes. Both studies showed that the relative influence of the domains differed across the samples. Most notable was that, despite being measured in different ways, both studies confirmed the importance of personal morality for understanding attitudes towards doping.

3.2 Comment on Dependent Variables: Attitudes, Intentions and Behaviours

Given that most cognitive decision models essentially propose that various beliefs influence attitudes, and that attitudes predict intentions, which in turn predict behaviour, the original model conflated attitudes and intentions but allowed for the influence of situational factors, and particularly accessibility and affordability, to facilitate or inhibit intentions being translated into behaviour.

Given that measuring any illegal behaviour via self-report has problems, many studies have relied on measures of attitudes towards doping behaviour, although a number also measured intentions and doping behaviour. Other dependent variable measures include the use of implicit association tasks as a surrogate for doping behaviour, measures of willingness to dope under certain circumstances, and a measure of susceptibility or vulnerability to doping (i.e., how much consideration would be given to an opportunity to dope; ability to resist a temptation to dope) as indicators of athletes' predisposition to doping. Overall, with some exceptions, and in spite of variations in question wordings, all of these measures have been found to be associated with doping behaviour.

It can also be noted that there are two related but fundamentally different purposes for specific research studies even though they may use the same measures:

1. Identifying factors related to past or current doping; and
2. Identifying factors related to non-doping athletes' attitudes toward or susceptibility to doping.

Both have implications for interventions, but the second allows the identification of ('at risk') athletes most in need of intervention and the factors that need to be addressed in the intervention. Many studies' conclusions are confounded by not distinguishing between these different but related goals.

3.3 Comment on Each of the Original SDCM Domains

We now comment on research in each of the original domains of the SDCM as shown in Figure 1, followed by comments on the broader societal and sporting culture domains of Figure 2. We have also added domains to the model where these represent significant and meaningful additions, and expanded others to include a broader range of variables.

In most cases we simply refer to broad summations of findings. However, where studies have potentially important implications for social science research, we describe those more fully.

3.3.1 Personality (and psychological variables) (Table 2)

As indicated by the number of studies listed in Table 2, personality is one aspect of the SDCM which has received a substantial amount of attention from social science researchers in the past decade. The original model postulated optimism, risk taking propensity and self-esteem as potentially relevant personality traits, along with self-efficacy constructs. Since then, a variety of personality traits have been included in a variety of studies, and particularly with respect to motivational orientation (i.e., mastery orientation, task and ego motivations, autonomous and controlled motivation, and amotivation). Given the terminology in the literature and the nature of the variables studied, we have re-named this domain 'Personality and Psychological Variables' to more explicitly include motivational goals and self-efficacy constructs.

Ntoumanis et al.'s (2013) meta-analysis confirmed the importance of personality variables for understanding attitudes to doping/doping intentions and doping behaviour. Aspects of one's personality which relate to motivation, goals (e.g., task versus ego) and beliefs (e.g., confidence in (i) abilities and (ii) confidence one can refrain from doping) were also found to be important considerations, along with self-presentational concepts which deal with one's perceptions of their body appearance or image to others. By and large, these meta-analytic findings have been substantiated in subsequent and previous research (see Table 2).

Most early personality studies included only one or a limited set of personality variables. Hence, Donovan et al. (2009) constructed a questionnaire consisting of 22 personality subscales representing 10 broad constructs deemed relevant to an understanding of athletes' susceptibility to doping (a three item measure of doping susceptibility). The questionnaire was completed by $n = 670$ Australian elite athletes (mean age 23.8 years), thus allowing a psychological profile of doping susceptibility to be constructed. Hierarchical clustering analysis on the doping susceptibility measure yielded a three-cluster solution with 17% of athletes categorised as high in susceptibility, 27% categorised as medium in susceptibility and 56% as low in susceptibility. Fourteen of the personality subscales significantly differentiated between the three susceptibility clusters, with self-presentational concerns, morality dimensions, fear of failure and identity issues showing the strongest associations, along with acceptance of cheating, concern for physical appearance, appearing athletically untalented and mastery approach. In collaboration with practicing sports psychologists, the researchers have developed an intervention that attempts to deal with the negative thoughts related to doping susceptibility (a grant to evaluate the intervention is currently under consideration). The intervention is positioned as "enhancing performance by dealing with negative thoughts", with no mention of doping.

Most recently, an experiment by Barkoukis et al. (in press) focused on self-presentational concerns via an affirmation manipulation. Intervention participants were asked to identify and write about their past acts of other-directed kindness (e.g., forgave someone, displayed empathy) while control participants wrote about unrelated issues (e.g., chocolate is the best ice cream flavour). Self-affirmed athletes reported weaker intentions and situational temptation scores with respect to doping when compared with the control group. These findings are among the first to experimentally manipulate personality characteristics to ascertain their influence on doping-related outcomes.

One point that comes to mind here is how this self-affirmation can be included in values and psychological interventions. For example such self-affirmations could be included at the beginning and end of the abovementioned intervention sessions, with care being taken to avoid a ‘polyanna-like’ approach (i.e., a focus on ‘shallow’ positive mood).

Although the above findings are quite clear and consistent with other findings (for example with respect to external versus intrinsic rewards), none of the personality studies has included specific measures of ‘the big five’ personality dimensions within psychology (extraversion; agreeableness; conscientiousness; emotional stability; openness), nor, other than our psychological profile study, have they looked at McAdams et al.’s (2006) ‘five big principles’ for individual difference variables which provide an insight into the multiple layers of understanding one’s personality (McAdams et al., 2006). Such integrative approaches, although complex, could well be one fertile area for better understanding how personality traits relate to doping behaviour in various sporting contexts, and hence better tailoring of psychological interventions targeting these traits.

As noted above, the original SDCM framework did not explicitly include response and self-efficacy components, although it was acknowledged that a coping appraisal can be added to the model to accommodate felt pressures to adopt doping. Given the now known pressures (by coaches and teammates in particular) on some athletes to dope, and various results showing the relationship between doping related measures and efficacy in resisting such pressures and measures of perceived behavioural control (PBC; e.g., Lucidi et al., 2008), a separate efficacy domain is now incorporated in the model (see Figure 5).

3.3.2. Morality (Table 3)

Research on the moral aspect of doping in sport has gained momentum in recent years (see Table 3), primarily with respect to ‘moral disengagement’ rather than moral stance per se as in the original SDCM. Under morality we include studies that have looked at variables such as sportsmanship, cheating and ‘anticipated regret’. Ntoumanis et al.’s (2013) meta-analysis confirmed the centrality of morality for both doping behaviours and intentions. Subsequent research has supported these meta-analytic findings. Athletes have identified morality as a

deterrent (Dimeo et al., 2011; Kirby et al., 2011) or protective factor to doping (Erickson et al., in press). The most common words associated with doping are ‘cheating’ and ‘lie’ (Morente-Sánchez et al., 2013), although some doping athletes did not view their actions as a form of cheating because of the (perceived) widespread nature of the practice in their sport (Kirby et al., 2011).

Others have extended this line of inquiry to consider the means by which individuals rationalise doping behaviour through moral disengagement. Moral disengagement has been associated with attitudes to doping, doping susceptibility, intentions, and doping use (Hodge et al., 2013; Lucidi et al., 2013). There is also clear evidence of several moral disengagement mechanisms in bodybuilders who have doped or were doping at the time of their interviews (Boardley & Grix, in press; Boardley et al., in press).

As previously noted, the two studies in which most (Gucciardi et al., 2011) or all (Jalleh et al., in press) of the SDCM components have been examined with single source data, confirmed the importance of personal moral stance for understanding attitudes towards doping.

Overall, it is clear that a moral stance against doping is a protective factor against doping. Nevertheless, moral disengagement studies show that, as in other areas, individuals use rationalisation processes to justify transgressive behaviours or to reduce dissonance between their values and their (adopted) misbehaviours. Hence research is required to understand these mechanisms, develop interventions to not only strengthen a moral stance but importantly, to deal with disengagement thoughts if and when they arise.

3.3.3 Reference groups (social norms) (Table 4)

The original model delineated a list of potentially influencing proximal reference groups (i.e., coaches/trainers; parents/family; team members; competitors; friends; and exercise scientists/pharmacologists/sports physicians/sports psychologists), as well as distal societal influencers (i.e., journalists; sponsors; spectators; government/politicians; etc). A number of studies have confirmed that these groups are more or less relevant to different athletes (e.g., Tsorbatzoudis et al., 2013) (see Table 4).

With respect to athletes, much of the available research has been guided by the social norm construct in Fishbein's Theory of Reasoned Action and Ajzen & Fishbein's later Theory of Planned Behaviour. They defined social norm influence as related to individuals' perceptions of important others' views on the issue and their motivation to comply with or act in accord with those others. In their meta-analysis, Ntoumanis et al. (2013) found that norms (e.g., subjective, descriptive, moral) were significantly associated with doping behaviours and intentions. The notion of feeling pressured by important others in one's social network has gained additional support in qualitative research (Chan, Hardcastle, Lentillon-Kaestner, in press), including discussions on the fear of rejection as a deterrent (Dimeo et al., 2011), and in work on resilience to social group pressures via secure social attachments throughout the lifespan shaping anti-doping attitudes (Erickson et al., in press).

There have also been studies (and recent high-profile cases such as Lance Armstrong and the professional football leagues in Australia) that reveal that not only are these reference groups influential in terms of attitudes and susceptibility, but often are sources of direct influence and supply. That is, coaches, team physicians and sports scientist advisers are complicit in implementing dubious if not outright illegal, substance use regimens (e.g., Macur, 2014, re Armstrong's team manager, coach, trainer, financial supporters and his three doctors).

While the perceived norms of these various groups with respect to doping have received much attention as influencing athletes' attitudes and behaviours, there has been very little research on how these different agents exert their influence, and, apart from limited studies of coaches, even less on what influences the attitudes of these reference groups towards doping and what might be relevant interventions for proximal groups in particular. Some studies have reported medical practitioners having limited knowledge of doping agents, despite receiving regular enquires about, or consulting with known users of doping agents (Backhouse & McKenna, 2011; Mazanov et al., in press). Allen et al. (2012) reported that some coaches believe that their role frame (e.g., personal belief in 'clean' sport, holistic approach to preparation and performance, responsibility to athletes) provides a strong foundation for anti-doping.

Although the indifference of some sports associations and clubs to adopting and conscientiously implementing anti-doping programs has been noted (e.g., WADA's recent

investigation of the Jamaican Anti-Doping Agency and WADA Working Group 2013), very little research has been undertaken with these groups as to what might bring about change in these groups. It could be argued that the reasons in many cases are self-evident (e.g., other priorities; a lack of resources; a desire to avoid embarrassing results; a drive to perform on the international arena; and so on). Nevertheless, some descriptive research would be appropriate in these areas.

As an example of the need to consider both the proximal and distal reference groups, a recent article by a registered dietician in a Canadian newspaper's 'Health Section' (The Globe and Mail) dealt with a mother's query as to whether it would be appropriate for her to acquiesce to her pre-teen, hockey-playing son's request to put protein 'in his smoothies' so he can 'bulk up'. Rather than forcefully reject such a notion, the dietician (who also has a weekly noon spot on a television channel), discusses various pros and cons and then concludes with advice to the son – rather than to the mother: "My advice to your 12 year old: Stick to whole foods for protein, and, if needed, bridge the gap with a protein powder" (Beck 2014). This clearly shows a need for research into and the development of interventions for these broader societal reference groups that overlap with sporting issues.

3.3.4 Deterrence – Threat appraisal (Table 5)

This domain represents an instrumental perspective that athletes' (and others') compliance with the WADA Code (and other regulations) is influenced by their perceptions of the relative costs and benefits associated with non-compliance (doping) and compliance (not doping) (the perceived Benefits of doping are covered in the next section). Hence, athletes (and others) are more likely to engage in doping when the perceived benefits of doping are seen to outweigh the perceived costs of doping. From a deterrence perspective then, it is vital to assess athletes' (and others') perceived costs of engaging in doping behaviours.

Under Threat Appraisal the original model referred to perceived health costs, the perceived likelihood of detection if doping and conviction if caught, the perceived severity of the doping sanction, and the perceived subsequent social, financial and personal costs.

The threat of negative health effects has some deterrent effect for some athletes (e.g., Overbye et al., 2013) and hence should be maintained. Again the research indicates that athletes need constant reminders of these effects for them to retain a deterrent effect. On the other hand, sports physicians (and others) can undermine these health threats by providing strategies to reduce the risk or promising to do so, again emphasising the need for research into physicians' attitudes to doping.

While many commentators claim that deterrence programs such as testing are 'ineffective' (Strelan & Boeckmann 2006), or not worth the cost (Hermann & Henneberg 2013), the basis for such claims is the non-detection of high profile athletes later found to have been doping, along with the low prevalence of positive tests relative to survey estimates of doping. However, these findings reinforce the view that increasing the likelihood of a test detecting a substance and being tested if using would in fact deter such athletes. Similarly, these claims of ineffectiveness ignore results suggesting that many athletes do not dope because of the threat of the sanctions if caught (Overbye et al., 2013). (Similar false claims of ineffectiveness are levelled at anti-smoking campaigns when a campaign does not completely eradicate smoking).

While there has been considerable research on the deterrence effects of testing and the costs of being caught if doping, there has been far less on what motivates athletes to comply; that is, the perceived benefits of not doping (other than freedom from the anxiety related to a fear of being detected – a 'cost' of doping). There are also mixed results in that different studies show conflicting levels of perceived deterrence. Given the centrality of testing, these data should be explored further, and particularly as they may reveal perceived and actual deficiencies in the local testing/regulation authority. For example, WADA's Working Group Report (2013) on the effectiveness of testing programs clearly states that the effectiveness of testing programs is hampered not so much by the 'science', but by 'human and political factors'; that is, a lack of willingness by relevant authorities to pursue rigorous compliance procedures and testing programs.

Research shows that deterrence is effective for many athletes where authorities have introduced a comprehensive in and out of competition testing program, and where tests exist that will detect the banned substance. At the same time, such deterrence is undermined by the collaboration of sports physicians and scientists who are able to advise athletes on drug use

patterns that minimise the likelihood of being detected at the time of testing. WADA's partnership with the pharmaceutical industry should increase the deterrence impact of testing.

Comment on deterrence for suppliers and facilitators

Recent events have confirmed the long suspected (in some circles anyway) involvement of the athlete's entourage in ignoring, encouraging, facilitating, and even supplying performance enhancing substances (e.g., Macur, 2014 re Armstrong). A recent case in Australia highlights the need for specific and legally enforced sanctions for such individuals where at present, there appear to be only non-specific sanctions for coaches and others if found to be involved in doping. In Australia a coach of a national level Australian Rules football team was deemed likely to have engaged in doping or doping related activities. His federation imposed a ban of one year from his coaching job. However, on the eve of him taking a year's absence, the Club paid his next year's salary in full – despite previous public denials they had done so (Le Grand, 2013).

Research is needed with all of these groups, and including members of the public and sports fans, to identify what penalties could be imposed that would be acceptable to the various stakeholders. A 'small wins' approach might be necessary such that increasingly severe penalties are introduced as the various stakeholder groups become accustomed to penalties.

3.3.5 Incentives – Benefit appraisal (Table 6)

Along with the perceived efficacy of the drug in question, the original SDCM proposed a number of relevant incentives for athletes' performance enhancing substances use, such as personal acclaim (a social approval motivation), financial returns, personal achievement, and a need for recognition due to low self-esteem. It was also acknowledged that these would vary by type of sport. For example, some sports involve considerable financial gains in sponsorship and salary, while others do not.

A number of studies have since shown that the major motivations for performance enhancing substances use are: to achieve athletic success; financial gains; and social recognition (Allahverdipour, Jalilian & Shaghaghi, 2012; Chan, Hardcastle, Lentillon-Kaestner et al., in press; Jalleh, 2013; Morente-Sanchez, Mateo-March & Zabala, 2013; Striegel, Vollkommer

& Dickhuth, 2002; Waddington et al., 2005). There are also situational or transient motivators such as speeding recovery from an injury (or exhaustive schedule), increasing self-confidence, plateauing in performance, and increased demands at particular career points.

While there will be some overlap in the relevance of these incentives for entourage members, there is a need for specific research to identify what are the incentives for these various others to assist an athlete to dope.

3.3.6 Legitimacy (Table 7)

Perceptions of authorities' legitimacy are major influencers of compliance with laws and regulations in general (Tyler, 1990). That is, people obey what they consider to be just laws, and where the authority introducing and enforcing the laws is perceived to have the right to dictate such behaviour.

The SDCM postulates that perceptions of the legitimacy of the regulative and testing authorities (WADA, NADOs and RADOs, sport federations, etc), the perceived fairness of the testing procedures (i.e., all athletes in all sports – and in all countries – are treated the same), the perceived accuracy of the analyses, and overall their perceived effectiveness of the regulations will influence an athlete's decision whether or not to dope.

While there is some qualitative indication that legitimacy is an influencing factor, there has been little or no quantitative research in this area other than that conducted by the authors. In a test of the overall SDCM model, legitimacy was significantly related to elite athletes' attitude to using performance enhancing substances (Jalleh et al., in press).

As far as we are aware, there appear to be no formal legitimacy modules in doping education interventions, nor does there appear to be any specific communication strategies by anti-doping organisations to reinforce legitimacy. Rob Koehler summed up the need for legitimacy interventions in prevention strategies in a Play True (2013) article in these words: "The key to success is to ensure an understanding of why rules are in place and communication of what those rules mean".

Research is needed to develop appropriate legitimacy modules not only for athletes, but also for the various entourage members.

3.3.7 ‘Market factors’: Affordability and availability

The original model in the 1990s envisaged these two factors as largely related to individual drug dealers having connections with individuals in medical or pharmaceutical companies rather than organised criminal trafficking and corporate involvement. However, the BALCO (Bay Area Laboratory Co-operative) affair (2002 – 2003) (and subsequent events and reports; e.g., Houlihan & Garcia, 2012; Paoli & Donati, 2013; Australian Crime Commission, 2013) drew attention to the role of the pharmaceutical industry as marketers of performance enhancing drugs, and particularly with respect to emerging drugs for which current tests were not available.

With respect to pharmaceutical manufacturers, WADA’s response has been to enlist the International Federation of Pharmaceutical Manufacturers and Associations in a ‘Joint declaration on the fight against doping in sport’. Moreover, WADA recently signed a long-term agreement with GlaxoSmithKline (GSK) to provide WADA with confidential scientific information about medicines in early stage development that could be abused by athletes once they are licensed for patent use. This will allow WADA to begin work on detection methods to be ready when the medicine is licensed.

The BALCO case also drew attention to the value of and need for investigations with respect to other forms of corroborative evidence where positive drug tests were not available (as in the Armstrong case); hence WADA’s 2011 report on “Coordinating investigations and sharing anti-doping information and evidence”. There is a need for research into athletes’ and their collaborators’ awareness of these developments and the deterrent or other impact on doping related beliefs and intentions of these developments.

Related to availability are issues surrounding the trafficking of illegal drugs (including prescription pharmaceuticals and banned performance enhancing substances), and the involvement of criminal elements. A WADA-commissioned report on the situation in Italy

(Paoli & Donati, 2013; see also Houlihan & Garcia, 2012) and an Australian Crime Commission Report (2013) with respect to substance use in Australian national football competitions confirmed that there is wide availability of banned substances and the need for government legislative interventions to assist in the fight against doping. Athletes' views on these matters have apparently not been studied in detail, but greater government involvement in investigations and enforcement should increase the deterrent effect.

3.4 Broader Societal and Sporting Culture Normative Influences **(Tables 8-12)**

The 2009 SDCM referred to the influences on athletes of broad societal factors such as: the medicalisation of society; the influence of science and technology through all areas of society; general trends for enhancement, such as in cosmetic and intellectual enhancement; the overriding, all-pervasive influence of globalisation, and particularly in corporates and media conglomerates; corporatisation in general, and the move to a market society where increasingly various activities (e.g., surrogate motherhood) are subject to the marketplace and the profit motive (see Table 8; particularly Stewart & Smith, 2008). All of these broad societal forces intrude into the sport culture, and particularly the medicalisation of sport, the rise of sports science (Table 9), sport as big business (e.g., Slack 1998) and the commercialisation of the Olympics (Table 10; e.g., Milton-Smith, 2002; Phillips, 1999), media conglomerates dominating sporting telecasts, and subsequent rule modification and event time-scheduling to meet national and international media audience requirements, and government politicisation of major events. The sort of sport culture resulting from the application of science and technology in sport is illustrated by Connor (2009):

An elite athlete bolts the door to his room in a publicly funded sports training institute. The day has consisted of a range of training sessions and techniques devised by his coach, biomechanical scientists and fitness trainers. His body was timed, tested and observed – all to ensure peak performance. He was subjected to psychological examination and taught mental strategies to 'enable' winning. A nutritionist crafted his diet to achieve a perfect balance of carbohydrates, vitamins and minerals. He took six different supplements to ensure that his body had every necessary nutrient. A media appearance was carefully supervised by

his manager, media liaison and sponsor representatives. Two hours of his day was consumed by physiotherapists and masseurs. His travel itinerary even factors in high altitude training before each competition. Every activity has been geared to enhancing his performance so that he can win (page 327).

There is a long history of government involvement in sport, and particularly at the international level with some countries in the past officially permitting doping for athletes potentially and actually competing in the international arena. Perhaps ironically, while some governments denounce doping athletes, they appear oblivious to their own actions that support a culture that facilitates doping. For example, UK Sport recently announced withdrawal of funding for several sports that would likely not yield a gold medal (SportBusiness, 2014a) and most countries now offer financial rewards for a gold medal (Singapore reportedly offers S\$1m) (Magnay, 2012).

The Olympic movement also has been tarnished in the past decade or so for corrupt practices and for being focussed on corporate interests (such as media rights and sponsorship protection) rather than on the Olympic ideals (see also Table 11).

Very few empirical studies attempt to relate these broader social and sporting culture factors to individual athletes' (or other entourage members') doping related attitudes and behaviours. Most articles simply refer to these factors as providing a facilitating environment conducive to doping. Our search and email to researchers revealed no recent empirical studies in these areas other than measures of the public's opinions on doping. A number of researchers have described or recommended a broader approach (e.g., Connor, 2009; Stewart & Smith, 2008; Johnson, 2011), but we found no comprehensive, quantitative studies of the impact of these broader factors on athletes – or coaches, officials, sports scientists and relevant others. However, in our 2004 survey of elite Australian athletes (Jalleh et al., in preparation), respondents reported increased 'temptation to dope' and to 'win at all costs' as a result of commercialisation of the Olympics and sport in general, with greater negative impact with higher sporting level: increased temptation to use banned performance enhancing substances: Olympics/world championships level: 60%; national level: 50%; state or lower levels: 43%; increased 'win at all costs': Olympics/world championships level: 53%; national level: 41%; state or lower levels: 29%.

With respect to sporting culture contexts, it has already been mentioned above that some sports are reluctant to engage in rigorous anti-doping activities and hence reinforce positive attitudes to and facilitate doping. There has also been considerable descriptive research and comment on both positive and negative aspects of sport and participation in sport. The positive aspects generally relate to physical health benefits, and, at a community level, to social cohesion, a sense of belonging, and the benefits of volunteering. However, at a professional level, comment and research often focuses on negative aspects such as violence, both on the field and amongst spectators, use and abuse of alcohol and illicit recreational drugs by athletes, the sponsorship of sport by alcohol and gambling companies, gambling-related corruption amongst athletes and corruption amongst sporting officials, a culture that values ‘winning at all costs’, driven by a profit motive and exemplified in cheating and other expressions of poor sportsmanship (see examples in Tables 12a-c).

Much of the above can be seen as a result of the globalisation and corporatisation of sport that has resulted in corporate profit motives being a dominant force in sport as in any other commercial enterprises (e.g., Stewart & Smith, 2008). The desire-for-profit force also drives the increased application of science and technology in sport which is being simultaneously driven by the increased application of science and technology in general.

Overall, there is a need for research on the impact of these sorts of factors on athletes, sporting officials, other entourage members and the general public, and how negative impacts can be countered.

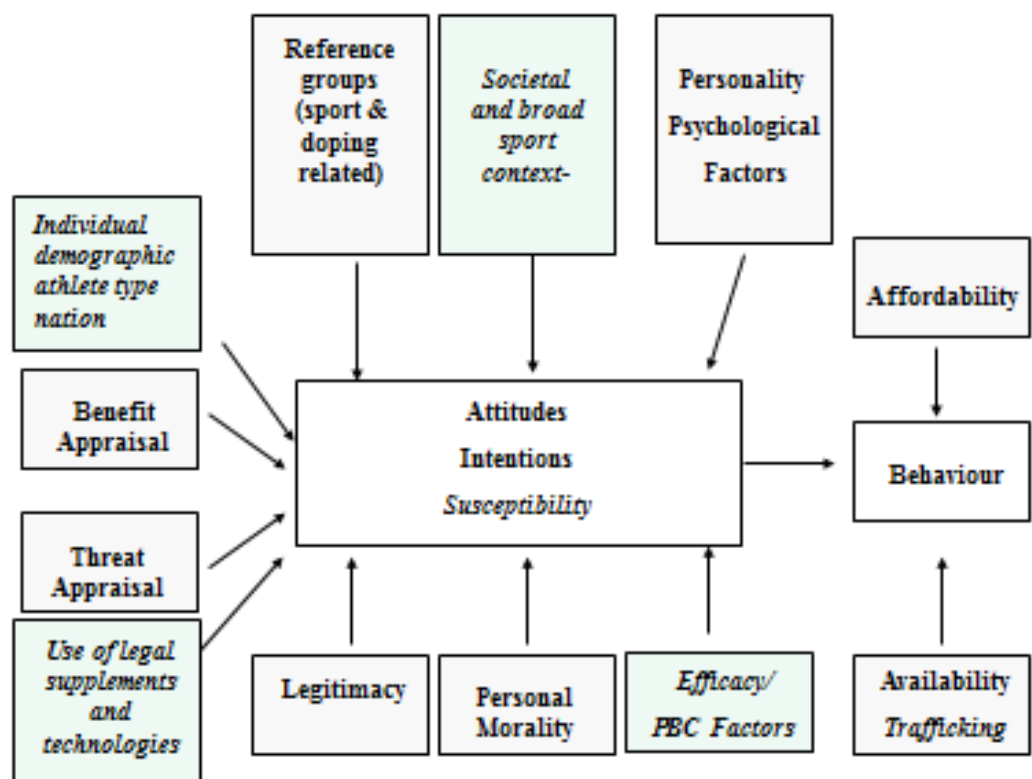
3.5 ‘Gateway’ Substances and Technologies (Table 13)

There is evidence that users of non-banned performance enhancing substances are more positive towards and more likely to be users of banned substances (Backhouse et al., 2013; Barkoukis et al., unpublished; see Table 13). On the other hand, there is evidence that others see such use as a substitute for – and hence protective against – doping behaviour. There is a need for research to better understand why use of legal substances leads some – but not other – athletes to using banned performance enhancing substances.

An increasing emphasis on science and technology may also serve as a ‘gateway’ to banned substance use as an athlete is introduced to the various tools and techniques mentioned by Connor above.

Perhaps related to this topic is the issue of Therapeutic Use Exemptions (TUEs). Apparently very little is known about athletes with such exemptions, the impact it has – if any – on attitudes to doping, and the perceptions of other athletes about the legitimacy and fairness of such exemptions (Overbye & Wagner, 2012).

Figure 5: Preliminary updated Sport Drug Control Model
(additions/elaborations shown in *italics*)



4. CONCLUSIONS AND RECOMMENDATIONS FOR CONSIDERATION

1. Since publication of the SDCM, a wide variety of research has confirmed the relevance of each of the original domains in predicting attitudes towards and engagement in doping.
2. We now have an extensive ‘list’ of variables that influence athletes’ attitudes, intentions and behaviours with respect to doping. The relative influence may vary by athlete level, type of sport and country. Nevertheless, all of the original and the added domains provide a comprehensive framework within which to plan interventions.
3. However, other than knowledge/education interventions and some inclusion of ‘sport values and fair play’ in these interventions, there have been few interventions developed that attempt to deal with variables now known to be related to doping. For example, there is now extensive research on the influence of personality and psychological variables on doping attitudes and behaviour, but other than the authors’ intervention, we are unaware of such research being translated into practice (it may well be in specific locations but is simply unreported).
4. In short, research is now needed for the development and evaluation of interventions related to attitudes to doping.
5. The original SDCM framework was deemed to apply also to coaches’, trainers’ and relevant others’ attitudes, intentions and behaviours with respect to doping. We would now include sports physicians, sports psychologists, nutritionists and sports scientists. While there has been some research (and revelations as a result of investigations) on the influence of these groups, and particularly coaches, on athletes’ attitudes, intentions and behaviours with respect to doping, there is little if any research on how these groups have come to hold their own beliefs about and attitudes to doping. This is one area where the influences of science, technology and medicine are perhaps most relevant.
6. Hence it is important to conduct research as to how to ensure that university and other courses include curriculum components related to the negatives of doping. Given the abovementioned dietician example, it also appears necessary to include doping modules in continuing education for relevant professional groups. Given the mass media context of this example, this will also impact how these broader societal reference groups comment on sporting and doping-related issues.

7. The related concepts of self-efficacy and perceived behavioural control need conceptual clarification in research. Similarly, normative effects are sometimes described as ‘pressure’ to adopt a behaviour where the measure has simply been of approval or non-approval of the behaviour.
8. From a deterrence perspective, this review identifies a need to introduce or make more explicit the deterrence for coaches, sports physicians, and others who assist in doping. Research is needed with all of these groups, and members of the public and sports fans, to identify what penalties could be imposed that would act as a deterrent and be acceptable to the various stakeholders.
9. While there will be some overlap in the relevance of incentives for entourage members to facilitate doping by athletes, there is a need for specific research to identify what are the incentives for these various others to assist an athlete to dope.
10. There is a clear need to understand how societal and sport culture forces (including perceptions of the Olympics) impact on athletes – and all others involved in sport. In particular we need to understand better the scenario painted by Connor (2009) of an ‘athlete’s day’. Overall, there is a need for research on the impact of these broad societal factors on athletes, sporting officials, other entourage members and the general public, and how negative impacts can be countered.
11. We found no research on the effect of government policies and funding actions, and the impact of such on doping vulnerability. Given the importance of such policies and the likely impact on temptations to dope, this is an area of need.
12. Legitimacy is grossly understudied. In particular, there is a need to understand what actions ‘on-the-ground’ negatively impact athletes’ and others’ legitimacy perceptions, and hence take action to counter these actions. Research is needed to develop appropriate legitimacy modules not only for athletes, but also for the various entourage members.
13. Recent cases have emphasised the role of investigations in addition to testing. Research into athletes’ (and relevant others’) views on these matters have apparently not been studied in detail, but greater government involvement in enforcement should increase the deterrent effect.
14. There is a need for pedagogical research for intervention for athletes 18+ years.
15. With respect to ‘gateways’ to doping, there is a need for research to better understand why use of legal substances leads some athletes to using banned performance enhancing substances whilst others see such use as a substitute for – and hence protective against – doping behaviour. An increasing emphasis on science and technology may also serve as

a 'gateway' to banned substance use as an athlete is introduced to the various tools and techniques mentioned by Connor.

16. Perhaps related to this topic (and that of legitimacy) is the issue of Therapeutic Use Exemptions (TUEs). Apparently very little is known about the impact these have – if any – on attitudes to doping, and the perceptions of other athletes about the legitimacy and fairness of such exemptions.
17. A moral stance against doping is a protective factor against doping. Nevertheless, moral disengagement studies show that individuals use rationalisation processes to justify doping and other transgressive behaviours or to reduce dissonance between their values and their (adopted) misbehaviours. Research is required to understand these mechanisms, develop interventions (for different ages) to not only strengthen a moral stance but, importantly, to deal with disengagement thoughts if and when they arise.
18. None of the personality studies included specific measures of 'the big five' personality dimensions within psychology (extraversion; agreeableness; conscientiousness; emotional stability; openness), nor, other than our psychological profile study, have they looked at McAdams et al's (2006) 'five big principles' for looking at individual difference variables which provide an insight into the multiple layers of understanding one's personality (McAdams et al., 2006). Such integrative approaches, although complex, could well be one fertile area for better understanding how personality traits relate to doping behaviour in various sporting contexts, and hence better tailoring of psychological interventions targeting these traits.
19. Finally, although the indifference of some sports associations and clubs to adopting and conscientiously implementing anti-doping programs has been noted above, very little research has been undertaken with these groups as to what might bring about change in these groups. It could be argued that the reasons in many cases are self-evident (e.g., other priorities; a lack of resources; a desire to avoid embarrassing results; a drive to perform on the international arena; and so on). Nevertheless, some descriptive research would be appropriate in these areas.

Overall, there appears to be a number of specific research gaps and three overarching research gaps:

- (i) Knowledge translational research: that is, translation of research findings into interventions, the evaluation of those interventions, and the implementation in practice of successful interventions;
- (ii) The factors influencing the athlete's entourage beliefs and attitudes about doping, what deterrents could be appropriate for these groups, and how tertiary curriculum and continuing education modules can be used to foster anti-doping attitudes and counter pro-doping attitudes;
- (iii) How broad societal forces, particularly commercialisation and government funding policies, influence athletes', officials', coaches', trainers' etc susceptibility to doping, and how these influences can be countered.

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6. SUMMARY TABLES OF REVIEWED LITERATURE

Table 1: Empirical tests of the Sport Drug Control Model

Authors	Sample	Design	Key Findings
Jalleh, Donovan and Jobling (2014)	1237 elite Australian athletes	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Morality (.64), legitimacy (.25) and reference group opinion (.19) were significantly associated with attitude to doping (81%), which in turn was associated (.36) with doping use (13%) ▪ Limitations: cross-sectional design
Gucciardi, Jalleh, and Donovan (2011)	643 elite Australian athletes	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Morality (.40), benefit appraisal (.25) and threat appraisal (.14) were significantly associated with attitude to doping (30%), which in turn was associated (.33) with doping susceptibility (11%) ▪ Limitations: cross-sectional design; did not include measures of affordability or availability

Table 2: Overview of research on personality and attitudes to doping/intentions/doping susceptibility

Authors	Sample	Design	Key Findings
Ntoumanis et al. (2013)	63 datasets	Meta-analysis	<ul style="list-style-type: none"> ▪ Morality ($\rho = -.21$), amotivation ($\rho = .17$), self-efficacy to refrain from doping ($\rho = -.12$), task achievement goal orientation ($\rho = -.09$), and autonomous motivation ($\rho = -.06$) were significantly associated with doping behaviours. ▪ Morality ($r = -.31$), self-efficacy to refrain from doping ($\rho = -.27$), amotivation ($\rho = .24$), dissatisfaction with body appearance or body image ($\rho = .20$), ego achievement goal orientation ($\rho = .14$), and task achievement goal orientation ($\rho = -.08$) were significantly associated with doping intentions ▪ Limitations: most studies were cross-sectional ($k = 55$); limited research employed longitudinal/prospective ($k = 4$) or experimental designs ($k = 4$)
Sas-Nowosielski and Swiatkowska (2008)	830 athletes aged 14 to 40 ($M = 20.02$, $SD = 3.96$; 68% males)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Attitudes to doping were associated with both ego ($\beta = -.14$ to $-.21$) and task goal orientations ($\beta = .12$ to $.32$)
Donovan et al. (2009)	670 elite Australian athletes aged between 14 and 66 years ($M = 23.75$, $SD = 8.49$; 42% males)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Results from both variable-centred (i.e., regression) and person-centred (i.e., cluster analysis) analyses revealed that personal morality, self-presentational concerns, autonomous motivation, and perfectionism were the most important psychological concepts for understanding doping susceptibility.
Dimeo et al. (2011)	Study 2: 64 Scottish athletes aged 17 to 57 years ($M = 26$; 58% male)	Interviews ($n = 25$) and focus groups ($n = 39$)	<ul style="list-style-type: none"> ▪ Participants discussed a number of motivations to dope (sport-specific demands, desire to win, accelerated performance gains, peer-pressure, lack of confidence, country-specific demands, extrinsic rewards) and deterrents (the ban, loss of funding, moral integrity, fear of rejection, health risks)

Table 2: Overview of research on personality and attitudes to doping/intentions/doping susceptibility (Cont'd)

Authors	Sample	Design	Key Findings
Kirby et al. (2011)	5 male athletes aged 29 to 46 who had doped (from Ireland, Scandinavia, and US)	Retrospective interviews	<ul style="list-style-type: none"> ▪ Alongside conscience or morality, both mental toughness and personal goals or aspirations were discussed as influential psychological factors ▪ Three said mental toughness would make one more susceptible as they would be so goal-focused, whereas two athletes thought this factor would minimise one's susceptibility (e.g., resisting temptations, high self-confidence) ▪ Discussion of personal goals or aspirations was not entirely clear (e.g., higher goals + perfectionism)
Barkoukis et al. (2013)	750 elite Greek athletes ($M = 24$, $SD = 5.89$; 64% males)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Situational temptations ($r = .75$), self-determined motivation ($r = -.15$), mastery-approach goals ($r = -.11$), mastery-avoidance goals ($r = .09$), performance-approach goals ($r = .16$), performance-avoidance goals ($r = .22$), sportspersonship ($r = -.17$), and perceived behavioural control ($r = .28$) were significantly associated with doping intentions
Hodge et al. (2013)	224 competitive NZ athletes ($M = 20.3$, $SD = 3.1$; 41% males)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Controlled motivation associated with doping susceptibility ($r = .17$)

Table 2: Overview of research on personality and attitudes to doping/intentions/doping susceptibility (Cont'd)

Authors	Sample	Design	Key Findings
Lucidi et al. (2013)	1975 Italian high-school students aged 13 to 18 years ($M = 16.3$, $SD = 1.5$; 51% males)	Prospective survey with 2 time points	<ul style="list-style-type: none"> ▪ Doping intentions associated with attitudes toward doping ($\beta = .28$) and doping self-regulatory efficacy at T1 ($\beta = -.24$); in turn, doping intentions at T1 were associated with doping use ($\beta = .22$) and supplements use ($\beta = .90$) at T2 ▪ Positive association between supplements use and doping use at T1 ($\beta = .70$) and T2 ($\beta = .38$) ▪ Subsequent cluster analyses and their differences revealed that individuals who adopt an ego goal orientation and who assign relatively higher importance on definitions of success and competence evaluations which are other-referenced (e.g., outperformed others) reported a “susceptible” profile (i.e., higher positive attitudes to doping and doping intentions, and lower doping self-regulatory efficacy) ▪ Limitations: self-reported doping use among high-school students
Tsorbatzoudis et al. (2013)	428 competitive athletes (M age = 23.5, $SD = 6.02$; 66% males)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Situational temptations ($\beta = .36$) were significantly associated with doping intentions ▪ Limitations: self-reported, cross-sectional data
Barkoukis et al. (in press)	60 Greek athletes (75% male; no other demographic information obtained due to sensitive nature of topic)	Online, experimental design (affirmation manipulation)	<ul style="list-style-type: none"> ▪ Participants in the affirmation manipulation group reported lower doping intentions and less self-efficacy when compared with the control group ▪ Limitations: self-reported outcome variables
Chan, Hardcastle, Lentillon-Kaestner et al. (in press)	57 elite and sub-elite team sport athletes aged 16 to 25 years.	Focus groups (x 8)	<ul style="list-style-type: none"> ▪ Personal attitudes regarding the potential effects (reputation and getting caught; health effects) and motivations to use PEDs (financial incentives) ▪ Limitations: cross-sectional design

Table 2: Overview of research on personality and attitudes to doping/intentions/doping susceptibility (Cont'd)

Authors	Sample	Design	Key Findings
Chan, Hardcastle, Dimmock et al. (in press)	410 elite and sub-elite athletes (M age = 17.70, SD = 3.92; 55% males)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Perceived behavioural control (β = .39) but not attitudes were associated with intentions to avoid doping ▪ Attitudes were associated with behavioural belief-strength (β = .34) and outcome evaluation (β = .19) ▪ Perceived behavioural control was associated with control belief-strength (β = .13) and control belief-power (β = .38) ▪ Limitations: cross-sectional design
Erickson et al. (in press)	10 competitive athletes aged 18 to 30 years (50% males)	Interviews	<ul style="list-style-type: none"> ▪ Participants identified five distinct protective factors, three of which were related to personal factors: self-control, identity beyond sport (where it centred on intrinsic motivation for playing sport), and resilience to social group pressures ▪ Limitations: cross-sectional interviews; 9 of 10 athletes admitted to being fairly naïve with regard to PEDs in their sport
Allen et al. (under review)	177 elite Scottish athletes aged 13 to 61 years (M = 23.29, SD = 8.27; 46% males)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Doping attitudes associated with task goal orientations (β = -.33) and ego goal orientations (β = .31) ▪ Limitations: cross-sectional design
Chan, Donovan, et al. (submitted)	410 elite and sub-elite athletes (M age = 17.70, SD = 3.92; 55% males)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Autonomous and controlled motivation, respectively, inversely associated with doping intentions (r = -.44; r = -.39), and positively related with anti-doping intentions (r = .23; r = .25), behavioural adherence to anti-doping behaviours (r = .18; r = .22), and not eating a free, but unfamiliar lollypop (r = .15; r = .18); only autonomous motivation was associated with reading the ingredients label of the unfamiliar lollypop (r = .12).

Table 2: Overview of research on personality and attitudes to doping/intentions/doping susceptibility (Cont'd)

Authors	Sample	Design	Key Findings
Chan, Dimmock et al. (submitted)	410 elite and sub-elite athletes (<i>M</i> age = 17.70, <i>SD</i> = 3.92; 55% males)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Autonomous motivation in sport associated with attitudes ($\beta = .23$), subjective norms ($\beta = .17$), perceived behavioural control ($\beta = .26$), and intentions to avoid doping ($\beta = .16$) ▪ Controlled motivation in sport associated with attitudes ($\beta = -.11$), subjective norms ($\beta = -.17$), and intentions to avoid doping ($\beta = .12$) ▪ Attitudes associated with autonomous motivation to avoid doping ($\beta = .33$) ▪ Subjective norms associated with autonomous motivation to avoid doping ($\beta = .23$), controlled motivation to avoid doping ($\beta = .16$), and amotivation to avoid doping ($\beta = -.09$) ▪ Perceived behavioural control associated with autonomous motivation to avoid doping ($\beta = .30$) ▪ Intentions to avoid doping associated with autonomous motivation ($\beta = .25$) and controlled motivation ($\beta = .21$) ▪ Limitations: cross-sectional design
Lazuras et al. (under review)	650 athletes aged 14 to 20 years (<i>M</i> age = 16.09, <i>SD</i> = 1.50; 68% males)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Attitudes ($\beta = .17$), situational temptation ($\beta = .39$), and anticipated regret ($\beta = -.22$) were significantly associated with doping intentions ▪ Perceived behavioural control and situation self-efficacy mediated the association between mastery-approach goals and doping intentions ▪ Attitudes and anticipated regret mediated the association between sportpersonship orientations and doping intentions ▪ Limitations: cross-sectional, self-reported data

Table 3: Overview of research on morality and attitudes to doping/intentions/doping susceptibility

Authors	Sample	Design	Key Findings
Ntoumanis et al. (2013)	63 datasets	Meta-analysis	<ul style="list-style-type: none"> ▪ Morality was significantly associated with doping behaviours ($\rho = -.21$) and intentions ($\rho = -.31$) ▪ Limitations: most studies were cross-sectional ($k = 55$); limited research employed longitudinal/prospective ($k = 4$) or experimental designs ($k = 4$)
Dimeo et al. (2011)	Study 2: 64 Scottish athletes aged 17 to 57 years ($M = 26$; 58% male)	Interviews ($n = 25$) and focus groups ($n = 39$)	<ul style="list-style-type: none"> ▪ Participants identified moral integrity as a deterrent to doping
Kirby et al. (2011)	5 male athletes aged 29 to 46 who had doped (from Ireland, Scandinavia, and US)	Retrospective interviews	<ul style="list-style-type: none"> ▪ Athletes did not view their doping behaviour as cheating because of the (perceived) widespread nature of the practice in their sport ▪ Athletes viewed conscience or morality was an important factor in an athlete's decision to engage in doping (e.g., moral character, value system)
Barkoukis et al. (2013)	750 elite Greek athletes ($M = 24$, $SD = 5.89$; 64% males)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Sportspersonship ($r = -.17$) was significantly associated with doping intentions
Hodge et al. (2013)	224 competitive NZ athletes ($M = 20.3$, $SD = 3.1$; 41% males)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Moral disengagement was significantly associated with attitudes to doping ($r = .52$) and doping susceptibility ($r = .25$) ▪ Limitations: cross-sectional design
Lucidi et al. (2013)	1975 Italian high-school students aged 13 to 18 years ($M = 16.3$, $SD = 1.5$; 51% males)	Prospective survey with 2 time points	<ul style="list-style-type: none"> ▪ Doping moral disengagement was associated with doping intentions at T1 ($\beta = .15$) and doping use at T2 ($\beta = .25$) ▪ Limitations: self-reported doping use among high-school students

Table 3: Overview of research on morality and attitudes to doping/intentions/doping susceptibility (Cont'd)

Authors	Sample	Design	Key Findings
Morente-Sánchez et al. (2013)	72 Spanish national team cyclists (<i>M</i> age = 19.67, <i>SD</i> = 4.72; 71% males)	Cross-sectional survey with open-ended question	<ul style="list-style-type: none"> ▪ The most common words associated with doping were cheating (45%) and lie (29%).
Tsorbatzoudis et al. (2013)	428 competitive athletes (<i>M</i> age = 23.5, <i>SD</i> = 6.02; 66% males)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Moral norms ($\beta = -.27$) were significantly associated with doping intentions ▪ Limitations: self-reported, cross-sectional data
Boardley and Grix (in press)	9 bodybuilders aged 20 to 30 years (89% males), who had doped/were currently doping	Retrospective interviews	<ul style="list-style-type: none"> ▪ Evidence was found for 6 of 9 moral disengagement mechanisms described by Bandura (1991): displacement of responsibility; diffusion of responsibility; advantageous comparison; distortion of consequences; moral justification; and euphemistic labelling ▪ Three inductively-derived themes emerged: routinisation (i.e., supplement and PED use becoming part of an athlete's daily routine); family and referrals (i.e., compartmentalising PED use, making clear distinctions between 'gym friends', and 'non-gym friends' and family); and sliding scale (i.e., supplement use being one end of a continuum, with PED use in the form of tablets in the middle, and 'injectables' at the far end) ▪ Limitations: sampled only one gym, little information on "current users" versus "past users"

Table 3: Overview of research on morality and attitudes to doping/intentions/doping susceptibility (Cont'd)

Authors	Sample	Design	Key Findings
Boardley et al. (in press)	64 English male bodybuilders with doping experience (<i>M</i> age = 32.36)	Interviews	<ul style="list-style-type: none"> ▪ Found evidence supporting six mechanisms of moral disengagement: moral justification, euphemistic labelling, advantageous comparison, displacement of responsibility, diffusion of responsibility and distortion of consequences ▪ Evidence for the sliding scale notion, which relates to descriptions reflecting progression from legal supplement use, to initial use of PEDs often in the form of tablets, and finally to serious PED use such as progression from oral to injectable steroids, use of multiple steroids and/or other substances such as growth hormone ▪ Limitations: retrospective recall, and no distinction between (non)competitive bodybuilders

Table 4: Overview of research on reference groups/social contexts and attitudes to doping/intentions/doping susceptibility

Authors	Sample	Design	Key Findings
Erickson et al. (in press)	10 competitive athletes aged 18 to 30 years (50% males)	Interviews	<ul style="list-style-type: none"> ▪ Participants identified five distinct protective factors, one of which was related to morality namely a strong moral stance against doping (where they considered it to be cheating) ▪ Limitations: cross-sectional interviews; 9 of 10 athletes admitted to being fairly naïve with regard to PEDs in their sport
Ntoumanis et al. (2013)	63 datasets	Meta-analysis	<ul style="list-style-type: none"> ▪ Norms (e.g., subjective, descriptive, moral) were significantly associated with doping behaviours ($\rho = .36$) and intentions ($\rho = .53$) ▪ Limitations: most studies were cross-sectional ($k = 55$); limited research employed longitudinal/prospective ($k = 4$) or experimental designs ($k = 4$)
Backhouse and McKenna (2011)	Medical practitioners: six studies met inclusion criteria	Systematic review	<ul style="list-style-type: none"> ▪ Medical practitioners believed they play an important role in doping prevention; it is not uncommon for them to receive enquiries about, or consult with known users of, doping agents; medical practitioners have limited knowledge of doping agents (e.g., classes of prohibited substances); and positive attitudes to doping prevention (e.g., consider it a public health problem, discourage if requested)
Dimeo et al. (2011)	Study 2: 64 Scottish athletes aged 17 to 57 years ($M = 26$; 58% male)	Interviews ($n = 25$) and focus groups ($n = 39$)	<ul style="list-style-type: none"> ▪ Younger athletes (<20 years) had not previously engaged in discussions about PEDs with their teammates or coaches, and generally had a limited understanding of doping issues; majority of remaining athletes provided examples of discussions and anecdotal evidence concerning other athletes who had taken PEDs ▪ Participants referred to the reaction of teammates, family members and competitors as a deterrent (fear of rejection) ▪ Participants perceived that some sports are more prone to doping than others; when probed, some athletes believed doping was or was not an issue for their sport

Table 4: Overview of research on reference groups/social contexts and attitudes to doping/intentions/doping susceptibility (Cont'd)

Authors	Sample	Design	Key Findings
Kirby et al. (2011)	5 male athletes aged 29 to 46 who had doped (from Ireland, Scandinavia, and US)	Retrospective interviews	<ul style="list-style-type: none"> ▪ Athletes perceived doping to be ‘commonplace’ and pervasive in their sport, so felt pressured to conform (particularly when teammates were doping and expressed favourable attitudes to PEDs)
Allen et al. (2012)	23 coaches in Scotland ($M_{\text{age}} = 43$ years, $M_{\text{experience}} = 19$ years; 74% males)	Interviews	<ul style="list-style-type: none"> ▪ Participants believed the coaches’ role frame (e.g., personal belief in ‘clean’ sport, holistic approach to preparation and performance, responsibility to athletes) provides a strong foundation for anti-doping ▪ Anti-doping was an implicit rather than explicit part of their coaching practice (and therefore not surprisingly a low priority)
Hodge et al. (2013)	224 competitive NZ athletes ($M = 20.3$, $SD = 3.1$; 41% males)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Controlling coaching environment positively associated with attitudes to doping ($r = .21$) and doping susceptibility ($r = .20$)
Lucidi et al. (2013)	1975 Italian high-school students aged 13 to 18 years ($M = 16.3$, $SD = 1.5$; 51% males)	Prospective survey with 2 time points	<ul style="list-style-type: none"> ▪ Subjective norms associated with doping intentions ($\beta = .30$) ▪ Limitations: self-reported doping use among high-school students
Tsorbatzoudis et al. (2013)	428 competitive athletes ($M_{\text{age}} = 23.5$, $SD = 6.02$; 66% males)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Perceived prevalence of doping among teammates ($\beta = -.17$), teammate normative climate ($\beta = .21$), team subjective norms ($\beta = .26$), and group orientation ($\beta = .16$) were significantly associated with doping intentions ▪ Group orientation moderated that association of teammate normative climate with doping intentions ($\beta = .24$) ▪ Limitations: self-reported, cross-sectional data

Table 4: Overview of research on reference groups/social contexts and attitudes to doping/intentions/doping susceptibility (Cont'd)

Authors	Sample	Design	Key Findings
Blank et al. (in press)	883 parents of junior Austrian athletes (<i>M</i> age = 45.98, <i>SD</i> = 4.98; 46% males)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ With regard to doping knowledge, 18.8% of the parents surveyed reported feeling poorly informed, 45.5% reported feeling moderately well informed, and 31.4% reported feeling well informed to very well informed ▪ Parents sourced information from the internet (51%), WADA/NADA hotlines (23%), and physicians (1-12% depending on type)
Chan, Hardcastle, Lentillon-Kaestner et al. (in press)	57 elite and sub-elite team sport athletes aged 16 to 25 years.	Focus groups (x 8)	<ul style="list-style-type: none"> ▪ Coaches (e.g., trust), parents, and medical doctors and sport scientists were viewed as significant others who exerted social pressure that influenced athletes' motivation and intentions to used PEDs ▪ Limitations: cross-sectional design
Erickson et al. (in press)	10 competitive athletes aged 18 to 30 years (50% males)	Interviews	<ul style="list-style-type: none"> ▪ Participants identified five distinct protective factors, two of which were related to the social context: resilience to social group pressures (e.g., peer pressure, social norms) and secure attachments throughout the lifespan (e.g., coaches, parents) who were important for shaping athletes' (anti)doping attitudes ▪ Limitations: cross-sectional interviews; 9 of 10 athletes admitted to being fairly naïve with regard to PEDs in their sport
Mazanov et al. (in press)	292 athlete support personnel (<i>M</i> age = 40.20, <i>SD</i> = 13.5; 54% males)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Sports physicians demonstrated the highest level of knowledge; highest knowledge regarding what constituted a doping violation (86-96%), though worse on obligations of support person under the WADC (54-72%) ▪ Practice of anti-doping by support personnel was less certain than agencies (e.g., ASADA), policy writers or commentators may expect (some support personnel overlooked some practices and were in about the 'rightness' of others) ▪ Limitations: cross-sectional survey, biased sample (e.g., some considered the topic irrelevant to their profession)

Table 4: Overview of research on reference groups/social contexts and attitudes to doping/intentions/doping susceptibility (Cont'd)

Authors	Sample	Design	Key Findings
Allen et al. (under review)	177 elite Scottish athletes aged 13 to 61 years ($M = 23.29$, $SD = 8.27$; 46% males)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Mastery motivational climate associated with doping attitudes ($\beta = -.21$) but not performance motivational climate ▪ Limitations: cross-sectional design
Chan, Dimmock et al. (submitted)	410 elite and sub-elite athletes (M age = 17.70, $SD = 3.92$; 55% males)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Autonomous motivation in sport associated with subjective norms ($\beta = .17$) ▪ Controlled motivation in sport associated with subjective norms ($\beta = -.17$) ▪ Subjective norms associated with autonomous motivation to avoid doping ($\beta = .23$), controlled motivation to avoid doping ($\beta = .16$), and amotivation to avoid doping ($\beta = -.09$) ▪ Limitations: cross-sectional design
Chan, Hardcastle, Dimmock et al. (in press)	410 elite and sub-elite athletes (M age = 17.70, $SD = 3.92$; 55% males)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Subjective norms ($\beta = .19$) were associated with intentions to avoid doping ▪ Subjective norms were associated with normative belief-strength ($\beta = .24$) and motivation to comply ($\beta = .16$) ▪ Limitations: cross-sectional design
Lazuras et al. (under review)	650 athletes aged 14 to 20 years (M age = 16.09, $SD = 1.50$; 68% males)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Subjective norms ($\beta = .13$) and acquaintance with dopers ($\beta = .08$) were significantly associated with doping intentions ▪ Limitations: cross-sectional, self-reported data
Lucidi (in progress)	Convenience sample of coaches ($n = 10$), sport managers ($n = 2$), athletes ($n = 8$) and sport journalist ($n = 1$)	Focus groups	<ul style="list-style-type: none"> ▪ The persons/professionals the athletes are on contact with (e.g., coaches, teammates) and individuals outside of the team/sport context (e.g., relatives, physicians) considered important for understanding doping behaviour

Table 5: Overview of research on threat appraisal

Authors	Sample	Design	Key Findings
Appraisal of threat of enforcement			
Overbye, Knudsen & Pfister (in press)	645 elite Danish athletes from 40 sports (mean age: 22.12 years; males: 59%)	Online survey	<ul style="list-style-type: none"> ▪ Hypothetical situation in which athletes had to decide whether to dope or not to dope. Presented with reasons not to dope (deterrents). Response categories: no effect; some effect; great effect; I don't know; I don't think it will be like that. ▪ Deterrents (% great effect / % some effect): That you will be banned from your sport if you are caught: 84% / 12%; Family/peers would disapprove of you: 79% / 13%; Coach/peers in the sport would disapprove of you: 75% / 17%; Guilty conscience: 72% / 20%; Not able to enjoy good results: 68% / 22%; Risk that suspicion would be cast on former results: 59% / 28%; It would be embarrassing to be tested positive: 57% / 28%; Consequences for others if found out: 53% / 33%; Financial consequences if found out: 45% / 31%; Hard to dope in your sport without being found out: 37% / 34%; 100% sure that you will not be found out: 35% / 26% ▪ Gender differences (% great effect) (males vs females): That you will be banned from your sport if you are caught: 81% vs 90%; Guilty conscience: 66% vs 81%; Risk that suspicion would be cast on former results: 58% vs 74%; It would be embarrassing to be tested positive: 52% vs 63%; Not able to enjoy good results: 64% vs 73%

Table 5: Overview of research on threat appraisal (Cont'd)

Authors	Sample	Design	Key Findings
Dimeo et al. (2011)	64 Scottish athletes aged 17 to 57 years (mean age: 26 years; males: 58%)	Interviews ($n = 25$) and focus groups ($n = 39$)	<ul style="list-style-type: none"> ▪ Deterrents: the ban, loss of funding, moral integrity, fear of rejection, health risks
Chan, Hardcastle, Lentillon-Kaestner et al. (in press)	57 elite and sub-elite team sport athletes aged 16 to 25 years (mean age: 18.02 years)	Focus groups ($n = 8$)	<ul style="list-style-type: none"> ▪ Personal attitudes regarding the potential effects (reputation and getting caught; health effects)
Dunn et al. (2010)	974 elite Australian athletes aged 18 to 44 years (mean age: 23.1 years; males: 75.6%)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Responses to the statement: “Punishment for being caught using a banned substance is of the appropriate severity”: (strongly) agree: 62.6%; Neither agree/disagree: 10.5%; (strongly) disagree: 10.4%; don’t know: 12.1% ▪ Responses to the statement: “Punishment for being caught using a banned substance should be more severe”: (strongly) agree: 23.1%; Neither agree/disagree: 35.9%; (strongly) disagree: 25.2%; don’t know: 10.9%
Striegel, Vollkommer & Dickhuth (2002)	101 elite German athletes aged 15 to 25 years (males: 60.4%)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ “From your point of view, the frequency of current dope testing is just right/not often enough/too often?": ‘not often enough’ (over 60%); ‘just right’ (21%)
Waddington et al. (2005)	706 professional United Kingdom footballers	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Likelihood of being drug tested in the next 12 months: 40% (‘certain’: 2%; ‘likely’: 38%)

Table 5: Overview of research on threat appraisal (Cont'd)

Authors	Sample	Design	Key Findings
Lentillon-Kaestner (2013)	16 Swiss cyclists: cyclists hoping to join a professional team (n=6); neoprofessional cyclists (n=2); and former professional cyclists (n=8)	Semi-structured interviews	<ul style="list-style-type: none"> ▪ The former cyclists were not afraid of the doping tests because the tests were infrequent and inefficient; the majority of the tests were administered during the races; and they knew how to avoid a positive result (used undetectable substances or masking agents to avoid detection) ▪ The current cyclists are a little more afraid of doping tests, especially those outside of competitions ▪ The current cyclists do not know when the anti-doping controller will come, and they cannot use all of the strategies used in races to avoid the doping test ▪ The current cyclists believe that the tests in competitions are inefficient but necessary; if there were no tests, the use and abuse of doping substances would increase. For the in-competition doping tests, cyclists have some solutions to avoid testing positive ▪ At the nonprofessional level, anti-doping tests are not frequent, and the current cyclists would like to be tested more often
Appraisal of threat of ill-health effects			
Laure & Binsinger (2005)	6,402 French high school athletes		<ul style="list-style-type: none"> ▪ 93% believed that the use of banned performance-enhancing substances was 'always' dangerous to health
Overbye, Knudsen & Pfister (in press)	645 elite Danish athletes from 40 sports (mean age: 22.12 years; males: 59%)	Online survey	<ul style="list-style-type: none"> ▪ % great effect / % some effect: Fear of reduced fertility: 66% / 24%; Afraid the body would become dependent on a drug: 42% / 37%; Unknown long-term side-effects: 72% / 21% ▪ Gender differences (% great effect) (males vs females): Fear of reduced fertility: 61% vs 73%; Afraid the body would become dependent on a drug: 38% vs 49%

Table 5: Overview of research on threat appraisal (Cont'd)

Authors	Sample	Design	Key Findings
Strelan & Boeckmann (2006)	116 elite Australian footballers and soccer players	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Likelihood to use human growth hormone (hGH) in a hypothetical rehabilitation scenario (i.e., serious knee injury). Deterrence scores (high to low): material loss, important other, public, moral beliefs, teammate, legal, health concerns ▪ When athletes know that they cannot be caught, they were less likely to be concerned about feeling guilty for participating in the act, less likely to feel concerned about what important others will think of their behavior, and more likely to use
Schneider (2006)			<ul style="list-style-type: none"> ▪ The young elite cyclists in the present study rejected the health arguments against doping and perceived professional sport “by its very nature to be unhealthy” (p. 219)
Lentillon-Kaestner, Hagger & Hardcastle (2012)	16 Swiss cyclists: cyclists hoping to join a professional team (n=6); neoprofessional cyclists (n=2); and former professional cyclists (n=8)	Semi-structured interviews	<ul style="list-style-type: none"> ▪ Trivialisation of the health risks and side effects of the use of banned PES ▪ Cyclists believed that doping use can protect them from the harmful effects of the high physical demands associated with professional cycling ▪ The young cyclists were not concerned about the long-term health consequences of PES use ▪ The young cyclists focused on the short-term positive consequences of PES such as improving their performances, helping them achieve excellence, combating fatigue, and winning races ▪ Overall, the perceived benefits of the use of banned PES are viewed as outweighing the perceived health risks

Table 5: Overview of research on threat appraisal (Cont'd)

Authors	Sample	Design	Key Findings
Lentillon-Kaestner & Carstairs (2010)	8 elite Swiss cyclists in the transition from the amateur to professional (mean age: 22.75 years; males: 100%)	Semi-structured interviews	<ul style="list-style-type: none"> ▪ The cyclists rejected the health argument against doping. They regarded the health arguments against doping as misplaced and even absurd. They did not view safeguarding their health as a reason not to dope. ▪ The reasons for taking banned substances were to win, to be better and stronger than others, to avoid failure in cycling or in life. Athletes want to do their very best, and some are willing to use illegal substances or methods to achieve their goal
Boardley, Grix & Dewar (in press)	64 English bodybuilders aged 19 to 65 years (mean age: 32.26 years; males: 100%).	Semi-structured interviews	<ul style="list-style-type: none"> ▪ Participants were current or past users of PES ▪ They believe that they can control or prevent the potential negative health consequences associated with doping, facilitated by information gathered through sources such as internet forums and other dopers ▪ The delayed onset of many side effects and lack of external indicators of harm makes it easier to cognitively minimise the potential for harm ▪ They were selective in the information they source or recall in relation to health effects of PES. They recount use of doping products in medical practice rather than citing evidence highlighting the harmful side effects that can result from doping

Table 5: Overview of research on threat appraisal (Cont'd)

Authors	Sample	Design	Key Findings
Boardley & Grix (2013)	9 English bodybuilders aged 20 to 30 years (males: n=8).	Semi-structured interviews	<ul style="list-style-type: none"> ▪ Participants were current or past users of PES ▪ Distortion of consequences: They were aware of the potential health implications and side effects associated with PES use, but downplayed any negative effects of PES use on their health by focusing on positive aspects of their lifestyle associated with bodybuilding (e.g., being physically active, healthy diet) and comparing their overall lifestyles to those of the general population ▪ Gathering information may serve the purpose of creating and reinforcing distorted beliefs regarding the ability to control the potential negative health consequences of PES use
Alaranta et al. (2006)	446 elite athletes in Finland (mean age: 23.0 years)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ 74% reported that the use of banned substances is dangerous to health ▪ 3% believed that banned substances may be used ‘completely’ or ‘nearly’ without any adverse health effects
Ćorluka, Gabrilo & Blažević (2011)	181 football players in Bosnia and Herzegovina (Croats: n=61, age 23 ± 4 years; Serbs: n=57, age 22 ± 3 years; Bosniaks: n=63, age 23 ± 4 years)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ The main problem of doping is “doping is a health hazard”: Serbs: 84.6%; Croats: 65.7%; Bosniaks: 52.9%
Laure et al. (2004)	1,459 high school athletes in France (mean age: 16.6 years; males: 68%)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ % who believed that doping was not always hazardous to health was 49% among those who had used banned PES compared to 6% among non-users

Table 5: Overview of research on threat appraisal (Cont'd)

Authors	Sample	Design	Key Findings
Skinner, Moston & Engelberg (2012)	440 school-aged athletes in Australia aged 12 to 17 years	Cross-sectional survey	<ul style="list-style-type: none">▪ Perceived disadvantages of PES use: health problems: 65.8%; detection: 20.9%; cheating: 11.3%
Pärssinen & Seppälä (2002)			<ul style="list-style-type: none">▪ The risk of mortality was 4.6 times greater among chronic steroid users than non-users

Table 6: Overview of research on benefit appraisal

Authors	Sample	Design	Key Findings
Overbye, Knudsen & Pfister (in press)	645 elite Danish athletes from 40 sports (mean age: 22.12 years; males: 59%)	Online survey	<ul style="list-style-type: none"> ▪ Hypothetical situation in which athletes had to decide whether to dope or not to dope. Presented with reasons to try doping (incentives). Response categories: no effect; some effect; great effect; I don't know. ▪ Incentives (% great effect / % some effect): That the substance may reduce the damage to the body caused by training, competitions or injuries: 34% / 33%; Faster return to sport after long-lasting injury: 33% / 34%; Financially secured after career: 32% / 26%; Ensure you a victory at Olympics or other major competitions: 32% / 28%; That it would give you the last push towards top results: 31% / 28%; Faster return after illness: 28% / 36%; Ensure a gain in muscle mass: 20% / 33%; Interesting to experience the effect: 20% / 29%; Increase self-confidence/trust in one's own abilities: 19% / 31%; Stagnation in performance level for a long period of time: 14% / 31%; Meeting new demands during career transitions: 13% / 30%; Ensure weight loss: 11% / 18% ▪ Gender differences (% great effect) (males vs females): Ensure a gain in muscle mass: 24% vs 14%; Financially secured after career: 35% vs 28%
Backhouse, Whitaker & Petróczi (2013)	212 competitive athletes from 32 sports (mean age: 21.4 years; males: 65%)	Online survey	<ul style="list-style-type: none"> ▪ Nutritional supplement users expressed a significantly greater belief that doping is effective than nonusers (mean ratings: 3.6 vs 3.1 on a 6-point scale)

Table 6: Overview of research on benefit appraisal (Cont'd)

Authors	Sample	Design	Key Findings
Alaranta et al. (2006)	446 elite athletes in Finland (mean age: 23.0 years)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ 90% believed that banned substances or methods can enhance sport performance ▪ % believed that the following have performance-enhancing effects: anabolic steroids (73%); blood doping (60%); peptide hormones (59%); stimulants (57%); beta-blockers (22%); diuretics (16%); oral glucocorticoids (16%); narcotic analgesics (14%); and sedatives (9%)
Laure et al. (2004)	1,459 high school athletes in France (mean age: 16.6 years; males: 68%)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ 68% believed that “doping agents really improve performance in sports” ▪ 21% considered that the decision not to dope effectively relinquished all chances of “becoming a great champion”
Wroble, Gray & Rodrigo (2002)	1,553 school athletes aged 10 to 14 years in 34 states in the United States	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Less than 45% believed that using anabolic steroids would improve performance in their sport. (Note: 12% of the total sample reported that they had not heard of anabolic steroids)
Laure & Binsinger (2007)	3,564 school athletes in France (6 th grade)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ 44% of those who had used doping agents reported that they had won at least one sporting event as a result
Peretti-Watel et al. (2004)	458 elite student athletes in France aged 16 to 24 years	Cross-sectional survey	<ul style="list-style-type: none"> ▪ 90% reported that doping was dishonest, unhealthy and/or risky because of sanctions. ▪ Three clusters were identified according to their attitudes towards doping, health and performance: (1) those who considered doping as both dangerous and useless (n=242; 52.8%); (2) those who viewed doping as dangerous but helped improve performance (n=103; 22.5%); and (3) those who regarded doping as a dangerous but an essential adjunct to sporting and nonsporting achievement (n=113; 24.7%)

Table 6: Overview of research on benefit appraisal (Cont'd)

Authors	Sample	Design	Key Findings
Jalleh (2013)	1,237 elite Australian athletes (mean age: 23 years; males: 48.7%)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ “What outcomes does your sport offer you if you perform well?” (% a lot): personal best achievements: 68%; opportunities for remaining in the sport as coach, trainer or administrator: 34%; lucrative sponsorship deals: 11%; national celebrity status: 9%; future financial security: 9%; international celebrity status: 8%
Dimeo et al. (2011)	64 Scottish athletes aged 17 to 57 years (mean age: 26 years; males: 58%)	Interviews ($n = 25$) and focus groups ($n = 39$)	<ul style="list-style-type: none"> ▪ Motivations to dope: accelerated performance gains, extrinsic rewards
Chan, Hardcastle, Lentillon-Kaestner et al. (in press)	57 elite and sub-elite team sport athletes aged 16 to 25 years.	Focus groups ($n = 8$)	<ul style="list-style-type: none"> ▪ ‘Financial incentives’ was a motivation to use PES
Striegel, Vollkommer & Dickhuth (2002)	101 elite German athletes aged 15 to 25 years (males: 60.4%)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Main responses to the open-ended question: “What do you think is the main motivation behind taking doping drugs?”: achieve athletic success (86%); financial gain (74%); increasing self-confidence (30%); social recognition (24%) ▪ When asked: “Suppose you could earn money with your sports. Above which amount per year would you take doping drugs?”, 68.3% responded that they would not be willing to take such substances for one million or more German Marks.
Pitsch, Emrich & Kleinm (2007)			<ul style="list-style-type: none"> ▪ Reasons for using PES: to aid recovery from injury; and the economic pressures of elite sport

Table 6: Overview of research on benefit appraisal (Cont'd)

Authors	Sample	Design	Key Findings
Morente-Sanchez, Mateo-March & Zabala (2013)	72 Spanish national team cyclists (mean age: 19.67 years; males: 70.8%)	Cross-sectional survey	<ul style="list-style-type: none">▪ Main responses to the open-ended question on “reasons for initiation into doping”: sport achievements (45.8%); external pressures (29.2%); contract/money (26.4%)
Skinner, Moston & Engelberg (2012)	440 school-aged athletes in Queensland, Australia aged 12 to 17 years	Cross-sectional survey	<ul style="list-style-type: none">▪ Perceived advantages of PES use: performance enhancement: 52.2%; physical improvement: 29.6%; winning: 14.2%
Allahverdipour, Jalilian & Shaghghi (2012)	253 Iranian gym users aged 15 to 28 years (mean age: 22.2 years; males: 100%)	Cross-sectional survey	<ul style="list-style-type: none">▪ Reasons to use anabolic–androgenic steroids: to increase muscle mass and strength; boost performance athletically; and to look better
Waddington et al. (2005)	706 professional United Kingdom footballers	Cross-sectional survey	<ul style="list-style-type: none">▪ % would consider using performance-enhancing substances if it would guarantee them selection for their national side in the World Cup: 5%

Table 7: Overview of research on legitimacy

Authors	Sample	Design	Key Findings
Waddington et al. (2005)	706 professional United Kingdom footballers	Cross-sectional survey	<ul style="list-style-type: none"> ▪ A majority of footballers felt that the sanction for using performance-enhancing substances was ‘about right’ (59%). However, one in four footballers (25%) felt it was ‘not severe enough’. Only 3% of footballers felt that the sanction was ‘too severe’
Jalleh, Donovan and Jobling (2014)	1237 elite Australian athletes	Cross-sectional survey	<ul style="list-style-type: none"> ▪ Morality (.64), legitimacy (.25) and reference group opinion (.19) were significantly associated with attitude to doping (81%), which in turn was associated (.36) with doping use (13%) ▪ Limitations: cross-sectional design
Bloodworth & McNamee (2010)	40 young athletes from 13 different sports (mean age: 19.6 years; males: 55%)	Focus groups (<i>n</i> = 12)	<ul style="list-style-type: none"> ▪ Perception that testing procedures were less stringent in some countries than in the UK ▪ Hypothetical scenario: guaranteed success from anonymized doping. A significant minority of participants at least entertained the hypothetical possibility of doping in a thought experiment where the drug was guaranteed to ensure success and remain undetectable
Striegel, Vollkommer & Dickhuth (2002)	101 elite German athletes aged 15 to 25 years (males: 60.4%)	Cross-sectional survey	<ul style="list-style-type: none"> ▪ “Do you think the present dope tests are credible?”: 70.3% ‘yes’
UK Sport (2006)	874 elite United Kingdom athletes	Cross-sectional survey	<ul style="list-style-type: none"> ▪ 66% trusted the testing process (8% did not) ▪ Athletes who had undertaken a drug test were substantially more likely to indicate that they trusted the process than those who had never had a test: 72% vs 54% ▪ Among athletes who had been tested, 90% were satisfied that the test had been carried out fairly and accurately. Only 3% were dissatisfied with the testing process

Table 8: Broad conceptual frameworks including both individual and societal determinants of doping

Author	Synopsis
Donovan (2009)	Sporting norms and rules are more likely to be complied with if athletes have some input to the norms and rules, and particularly as athletes develop along their career trajectory. At the very least this means that in educational interventions, athletes must be given more than a list of banned substances and technologies – they must be given good arguments for banning and the opportunity to debate these arguments.
Donovan et al. (2002)	The model demonstrated that a comprehensive, fully integrated programme is necessary for maximal effect, and provides anti-doping agencies with a structured framework for strategic planning and implementing interventions. Programmes can be developed in each of the six major areas, with allocation of resources to each area based on needs-assessment research with athletes and other relevant groups.
Johnson (2011)	Because a firm theoretical or empirical understanding of doping does not exist, this article proposes a conceptual, comprehensive, and innovative systemic model of doping behavior. The model is built from relevant empiricism supporting the idea that contemporary doping behavior is a function of systemic transactions between historical doping practices, the present environment, current anti-doping interventions, one’s genetic makeup, developmental milestones, social factors, and epigenetics.
Stewart & Smith (2008)	The authors suggest that to broaden the debate the investigation should include an exploration of the context in which drug use occurs and a situational diagnosis of the assumptions, values, and beliefs that underpin drug use in sport. To this end, the authors have developed a model of drug use in sport that combines the micro orientation of individual athlete and interpersonal behavior with the macro orientation of sporting context, structure, and culture. They use this contextualized model to contrast a use-reduction policy with a harm-minimization policy that allows sport organizations and athletes to manage their drug use in a safe and secure environment.
Connor (2009)	A sociologically informed analysis of drugs in sport requires the researcher to focus upon social forces. It is a continuing flaw of the literature that the individual is prioritized over wider social forces. Author aims to provide a representative sketch of how the discipline questions and critiques social problems like drugs in sport. Includes arguing for a critical challenge to the mythologies of sport and drugs, and why and how sport and play are different, and exposing the role nationalism and ideology play in encouraging doping. Concludes by suggesting four avenues of research: amalgamating sport theory with drug theory, the concept of the networked athlete, prevalence rates and public perceptions of performance-enhancing drug use.

Table 8: Broad conceptual frameworks including both individual and societal determinants of doping (Cont'd)

Author	Synopsis
Sharpe (2009)	This essay explains the approach that economists take when explaining the phenomenon of drug-taking in sport. The economic method models such drug-taking as a rational activity in which athletes respond to the existing incentives. The 'solution' to the drugs in sport problem is to alter the incentives under which athletes operate. The essay notes that there are two means for implementing such alterations. The first is via regulation, and the second is via the operation of market forces within the market for different sports. The latter modality is naturally suggested as the preferred one by the economic method. However, full analysis of this issue has not been completed, so the essay is agnostic on the matter of the optimal manner for changing the incentives under which athletes operate.
Mazanov & McDermott (2009)	Social science began to take a prominent role in drugs in sport research in the early twenty-first century. This development has its roots in the history of drugs in sport, from the ancient Olympics through to the twentieth century, where the question of 'could' drugs enhance sporting performance, answered affirmatively, was replaced with whether they 'should'. The history of drug testing reveals that 'should' may have been asked too late, with the advent of potentially undetectable performance enhancements rendering testing ineffective as a deterrence method. In an effort to find alternative models to deter the use of drugs in sport, the focus has shifted from 'detection-based deterrence' to 'prevention-based deterrence'. Many of the questions underpinning prevention-based deterrence have the character of those asked by social science. Exploration of this character demonstrates social science offers an appropriate range of philosophical and methodological tools to explore prevention-based deterrence of drugs in sport.
Smith et al. (2010)	This article reports on 11 narrative-based case histories which sought to: (1) uncover the attitudes of players and athletes to drugs in sport, and (2) explore contextual factors influencing the formation of those attitudes as informed by social ecology theory. Overall, participants viewed the use of banned performance-enhancing substances as cheating, 'hard' non-performance-enhancing recreational or illicit substances as unwise, legal non-performance-enhancing substances as acceptable, and legal performance-enhancing substances as essential. In short, attitudes were sometimes quite libertarian, and contingent upon first, the legality of the substance, and second, its performance impact. Results also indicated that athletes' attitudes about drugs were fundamentally shaped by sport's culture. Other significant factors included its commercial scale, closely identifiable others, early experiences and critical incidents of players and athletes, and their level of performance.

Table 9: Science and technology in sport

Author	Synopsis
Enriquez & Gullans (2012)	Discusses growing evidence that world-class athletes carry a minimum set of particular ‘performance-enhancing’ genes. Authors predict that future Olympic Games may allow handicaps and gene therapy for people born without genes linked to athleticism.
Cressey & Callaway (2012)	Article describes the Olympics as a vast experiment in human performance, sport technology and global travel, and explains how science is involved in every aspect.
Haake (2009)	To assess the effect of technology on sport, the performance statistics for four disciplines were analysed: the 100-m sprint, pole vault, javelin, and cycling. The concept of a performance improvement index was developed to allow comparison between athletes and between sports with a higher index indicating a greater improvement in the sport. Study concluded that the performance improvement index could be extended to amateur as well as elite sport where distance or time is used as a measure of performance.
Ledford (2013)	Article detailing how a prestigious UK medical academy will consult for venture capitalists, to inform decisions about investments in late-stage biotechnology companies.

Table 10: Sport as business

Author	Synopsis
Slack (1998)	Since its formative years sport has had a commercial component to its operation. As early as 590 BC Greek athletes were financially rewarded for an Olympic victory. However, we've not seen the type of growth in the commercialization of sport that we have seen in the last two decades. Today, sport is big business and big businesses are heavily involved in sport. Athletes in the major spectator sports are marketable commodities, sports teams are traded on the stock market, sponsorship rights at major events can cost millions of dollars, network television stations pay large fees to broadcast games, and the merchandising and licensing of sporting goods is a major multi-national business. These trends are not just restricted to professional athletes and events, many of them are equally applicable to the so-called amateur sports.
Philips (1999)	The evolution of the Olympic Games, the IOC nepotism, vote selling and other forms of corruption now coming to light are argued to be unsurprising. The author asserts that they are inevitable by-products of the vast sums of money and multi-million dollar profits surrounding the event. Further, the author describes the Olympics as one of the world's most profitable international sporting events.
Shropshire (1991)	Key elements include: college sports as entertainment; payments for medals; cheating by the umpires; definitions of professional versus amateurs; and sports values.
Pitt et al. (2010)	Sponsorship of large sporting and cultural events has become a major marketing communication tool, particularly when firms obtain exclusive rights and garner the hype associated with this honor. Concomitantly, ambush marketing - defined as attempts by competitors to exploit the event - has also increased in prominence. This article outlines what is known as the Li Ning affair, whereby major Olympic sponsor Adidas was ambushed by lesser-known Chinese sportswear company Li Ning, whose namesake founder was the most decorated Chinese Olympian and who lit the Olympic flame at the 2008 Beijing Olympiad. Data collected immediately following the closing of the Beijing Games isolates what we call the Li Ning effect - or, being incorrectly identified as an official sponsor - and the positive effects this has on measures of brand attitude and recommendation likelihood.
Clegg & Espinosa (2010)	Describes the factors involved in moving to becoming a professional sport such as gaining sponsors. Outlines the training practices of one of the top players such as employing sports psychologists, nutritionists, and fitness trainers.
Mccarthy (2013)	Discusses the fallout from the Lance Armstrong doping scandal. Particular emphasis given to reaction from sponsors.
Anderson (2004)	This study used Berger's (1999) four characteristics of organizational public relations to examine how Major League Baseball (MLB) responded to the 1951-1952 congressional investigation into the sport's business dealings. This analysis demonstrated the impact an entity's image, which is based in large part on past communications and prior behavior, has on its current situation. In this case, MLB's image as a sport outweighed any effort by legislators to present professional baseball as a monopoly.

Table 10: Sport as business (Cont'd)

Author	Synopsis
Fry (2013)	Assesses the successes and failures of the brand advertising around the 2013 national Football League Super Bowl.
Gordon (2013)	Looks at how 2016 Olympic games broadcasters can raise their game on London 2012.
Stout (2012)	Describes how broadcasters are adopting a new breed of speciality cameras that are set to revolutionise the way we view sport.
McCullagh (2012)	Explains why rights agencies are ramping up the exploitation of unsold media rights on digital platforms.
Sport Business (2014)	Directory of agencies dedicated to the business of sport, including specialists in sponsorship, marketing, management, graphics, administration, branding, communications, software development, PR etc.
Shopshire (2013)	This course analyses the business side of sports and discusses the intricacies of global sports leagues as well as various countries' sports strategies. Students will be equipped with a framework and tools to understand and evaluate the business side of competitive sports around the world.
Jeffery (2013)	Article detailing the withdrawal of Energy Australia, a major sponsor, from Swimming Australia.
Parekh (2012)	Discusses the financial fallout from the Lance Armstrong doping scandal, including abandonment of his long time sponsors and that the losses could cost him up to \$30M.
Sport Business (2013)	Details the intention of French Ligue 1's Paris Saint-Germain to become the richest football club in the world by the 2016/17 season.
Cutler (2013)	Discusses how international sports organisations in Switzerland generated \$5.1 billion for the country's economy in 2011.
Sport Business (2013)	Article detailing how golfer Tiger Woods has returned to the top of the Forbes 100 Highest Paid Athletes list, following a successful comeback to the sport.
Odenkirk (1981)	Discusses the problems associated with intercollegiate athletics. Namely the excessive economic needs of the athletics programs and the abuses associated with recruitment of athletes.
Stewart (1980)	Discusses the change in the nature of sport from being an informal diversion from the structured, profit centred world of work to become large scale business enterprises.

Table 10: Sport as business (Cont'd)

Author	Synopsis
Mason (1999)	Professional sports have emerged as a lucrative business, with many opportunities for sports marketers to flourish. Professional sports teams unite to produce a league product that, while initially is produced to provide entertainment for spectators, is now sold to four distinct groups: first, fans who support leagues by attending games, following games on television and other media, and purchasing merchandise; second, television and other media companies which purchase the right to show games; third, communities which build facilities and support local clubs; fourth, corporations which support leagues and clubs by increasing gate moneys, purchasing teams outright, or providing revenues through sponsorships or other associations. As a result, professional sports leagues provide a unique environment for marketing decisions and processes to occur, in a number of markets and at a number of levels, and should continue to be a growing segment within the broader, global, entertainment industry.

Table 11: Sport culture re drugs in sport

Author	Synopsis
Milton-Smith (2002)	The backlash against the Olympic Games reflects the failure of the major global institutions in dealing with the social and ethical consequences of globalisation in areas such as the environment, poverty, terrorism and natural disasters. Disillusionment with the Olympic Games mirrors the disenchantment with the perceived values of globalisation, including winning at any price, commercial exploitation by MNCs, intense national rivalry, cronyism, cheating and corruption and the competitive advantage of advanced nations.
Cheng et al. (2010)	Despite deliberate efforts to promote the ideal of “One world, One dream,” the 2008 Beijing Olympics appears to have exaggerated Mainland Chinese’ perception of Chinese and Western cultural differences and increased low ingroup identifiers’ ingroup favoring emotions and perceptions. The results of the study suggest that the Olympics had widened the cultural divide between China and the Western world.
Fry (2013)	Opinion piece on (over?) reactions to drugs in sport. Argues that we live in an environment of moral panic, a new message has emerged: all performance-enhancing substances are suspicious and people should be punished for supplying, using and even knowing about the administration of these in sporting contexts.
Dimeo (2012)	Key points included that the sad truth is people don’t pay to watch losers and corporations don’t sponsor teams that don’t bring home the gold. The athletes and officials realise this, so they’re willing to do anything it takes to win. The 1980s were wide-open for doping, but the epidemic began in the 1970s when the Cold War rivalry was causing both sides to prize gold medals over ethical concerns about cheating. The Cold War Olympics rivalry was fuelled by steroids. The USSR and GDR had state-level policies to systematically dope their own athletes according to highly organised and scientific plans.
Hunt (2011)	Main argument is that rather than the IOC taking the lead on doping controls, it was international federations, national governing bodies and ultimately nation states that shaped Olympic anti-doping policy.
Donovan (2013)	Key points include that drugs in sport, cheating and match-fixing are the result not just of a few unethical or criminal minds, but also of broader societal forces impinging on sporting sub-cultures: the medicalization of society in general; the commercialisation if not corporatisation of sport, with its replacement of moral values with dollar-values, and the intensification of sporting schedules to feed this sport-as-entertainment business and hence the need for performance-enhancing and recovery substances just to keep up; and the self-enhancement focus in areas such as cosmetic surgery, body image and cognitive performance.
Magno (2013)	Discusses the sport of boxing and its reluctance to address PEDs use.
Chauhan (2013)	Report on the resignation of all eleven members of the Jamaican Anti-Doping Commission board following a report by WADA which found that the board had an insufficient testing programme.

Table 11: Sport culture re drugs in sport (Cont'd)

Author	Synopsis
Davis & Duncan (2006)	As of August 2003, 15.2 million American adults participated in fantasy sports. Fantasy sport allows online participants to assume the roles of owners, managers, and coaches of professional teams, building franchises and experiencing every phase of the process. Despite its great popularity, there is a paucity of research investigating fantasy sports. Taking a pro-feminist approach, the current study examines the appeals and experiences of participants and the audience fantasy sport leagues are directed. The study indicates that fantasy sports reinforce hegemonic ideologies in sport spectatorship, emphasizing authority, sports knowledge, competition, male-bonding, and traditional gender roles.

Table 12a: Sportsmanship/Role models

Author	Synopsis
Slater (2013)	News article about an on court meltdown by top tennis player, Andy Murray. The athlete smashed a racquet, screamed in his chair, yelled at himself and then ran off court when the game ended.
Barnes (2013)	News article about badly behaved athletes including Tiger Woods, George Best, Michael Schumacher, Lance Armstrong, John terry Mike Tindall and Anna Kournikova.
Chopra & Coady (2007)	This essay examines the ethics of a variety of on-field practices which are often thought to be unethical, including failure to walk when one knows one is out, appealing when one knows the batsman is not out, and 'Mankading'. Consequentialist, deontological, and virtue ethics perspectives are brought to bear on these practices. The essay also examines the dynamics of the relation between moral considerations and the emergence of new laws regulating cricket. An important illustration of this is the bodyline controversy of 1932, when a moral outcry led to significant changes in the Laws of Cricket. It is concluded that cricket's distinction between what is permitted by the Laws and what is morally permissible is a desirable feature of the game, although the precise way in which this distinction is drawn can and should be open to the possibility of change in response to evolving societal values.

Table 12b: Violence in sports

Author	Synopsis
Lavoie (2010)	News article about a particular incident of violence at youth sporting events. Describing how a man convicted of the manslaughter of a fellow father at a hockey games was seeking his conviction overturned.
Nielsen (1989)	Key points: Professional sports are big business. Society is immersed in the daily happenings of the sports world. Athletes are exalted as role models by youngsters, marketed by megafirms to sell their products, and paid handsomely by team owners. For businesses, professional athletes, and society, success in professional sports means profit. The high premium placed on victory has produced serious side effects such as drug abuse, widespread cheating, and excessive violence. Because professional sports play an important part in American society, its problems inevitably trickle into society's mainstream. Though legal commentators, sociologists, psychologists, journalists, and even players urge reform, the problems continue. The task of this Note is `to suggest a remedy for a problem that has been associated with sports since the ancient Greeks and Romans first engaged in combative rituals: Violence.

Table 12c: Sport and association with alcohol, gambling and corruption

Author	Synopsis
Cutler (2013)	News article describing a sponsorship agreement between Danish beer brand Calsberg and the European Championship.
Sports Business (2012)	Email newsletter from Sports Business to subscribers inviting them to attend a conference on sport and internet gaming.
Braig (2012)	Article about a court case attempting to prevent the state of New Jersey from establishing legal and regulated sports betting.
Gridley (2013)	The APS recently provided a submission to the Senate Inquiry into Advertising and Promotion of Gambling Services in Sport and followed this by presenting evidence at the hearing for the inquiry. The submission was based on the APS review paper on the psychology of gambling and position statement on gambling-related harm, and was prepared by the National Office Public Interest team with input from contributors to those papers and the National Executive of the APS College of Sport and Exercise Psychologists. This article is an edited extract from the submission. The Australian Government has announced moves to ban the promotion of betting odds on broadcast media during sports matches and to prohibit gambling advertisements during commercial breaks while matches are being played.
Hauw (2013)	Evidence suggests that regulating “recreational” drugs in sport is a sensitive undertaking. The social, medical, philosophical, legal and political concerns do not easily converge. However, arguments are suggested for promoting new sport regulations dealing specifically with these substances.
Carter (2013)	Radio interview between journalist Lucy Carter and AOC’s Chef de Mission for 2016 Kitty Chiller about new alcohol guidelines.

Table 13: Gateway factors and TUEs - Therapeutic Use Exemptions

Author	Synopsis
Tsochas, Lazuras & Barkoukis (2013)	Aim of study was to assess interplay between social physique anxiety, nutritional supplement use and related social cognitions in leisure time exercisers. Results showed about half had used nutritional supplements in preceding year and indicated that social physique anxiety, past supplement use, attitudes and social norms predicted intentions to use dietary supplements.
Backhouse, Whitaker & Petroczi (2013)	Article provides support for gateway hypothesis; athletes who engage in legal performance enhancement practices appear to embody an at-risk group for transition toward doping.
Overbye & Wagner (2012)	51% believed that athletes in their sport that athletes in their sport received TUEs without a medical need. Athletes granted TUEs had more than twice as high odds to distrust the efficacy of the system than athletes never granted a TUE. The belief that TUEs were misused was especially common among endurance athletes, regardless of them having experience with TUEs or not. 4% believed it would be okay to receive a TUE without a medical need.
Barkoukis et al.	Results indicated that that supplement users reported significantly stronger attitudes towards doping, perceived more social approval of doping by referent others, perceived more supportive team norms among teammates about doping use, did not view NS as a gateway to doping use, and reported stronger doping intentions. The study supported that more frequent nutritional supplement use can predict self-reported doping use and can initiate a cognitive process whereby users view doping more favourably as compared to non-users.

