



Does one play with the athletes' health in the name of ethics?



Bertrand Fincoeur^{a,*}, Monika Frenger^b, Werner Pitsch^b

^a University of Leuven – Leuven Institute of Criminology, Hooverplein 10, B-3000 Leuven, Belgium

^b Saarland University – Institute for Sport Sciences, Campus B8 1, 0.16, D-66123 Saarbrücken, Germany

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ABSTRACT

The anti-doping policy is based on three institutional pillars of varying importance and officially relies on two major motives: the defense of sports ethics and the protection of athletes' health. However, behind these official grounds, other considerations – i.e. moral, political and financial concerns – appear to shape anti-doping policy. Furthermore, the current trend of anti-doping efforts is to develop activities that tackle the supply-side of the doping market. In this article, we consider the possible impact of the emphasis on supply-side anti-doping on sport. The project focuses on Belgian and French elite cycling and relies on a multi-method instrumentation set, including the realisation of 77 semi-structured interviews among policy-makers, cyclists and their medical and technical staff as well as the administration of an online survey among competitive cyclists.

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The link between elite cycling and doping is common. Much evidence supports the belief that doping has been, and may still be, rampant in the sport. Indeed, numerous cyclists have tested positive and have confessed their practices in an act of atonement (e.g. Gaumont, 2005; Hamilton & Coyle, 2012; Millar, 2012). After the stir caused by the Armstrong affair, different commissions published reports documenting the matter (Commissie Anti-Doping, 2013; Sénat français, 2013). Additionally, the scholarly community has helped elucidate the hidden side of a profession in serious crisis (e.g. Brissonneau, Aubel, & Ohl, 2008; Christiansen, 2005; Hoberman, 2002; Schneider, 2006). Faced with these problems, several actors of elite cycling made efforts and levelled self-criticism in hopes of regaining credibility. But their investigations, paradoxically, brought more scrutiny as they often revealed new scandals which only reinforced the opinion that sport is contaminated. Numerous reasons to fight doping may actually be given. They can be structured around two main justification patterns which officially drive the anti-doping policy at both the international and national level: defending the spirit of sport and protecting athletes' health. It is however difficult to define accurately these two inspiring principles. Indeed, the 'spirit of sport', the 'fair-play' or the 'sport ethics' (hereinafter jointly referred to as 'sport ethics') are "concepts that mean no more in sport than they do in the world outside sport. (...) To talk of the spirit of sport is, in other words, to talk of a notion that apparently has no foothold

in reality, one that describes what idealists might wish it to be" (Møller, 2010: 14). Defining accurately what is 'protecting athletes' health' may also be difficult as most of performance-enhancing drugs (PED) which are used in the sports context are medicines developed to improve human health and as debates about human enhancement may confuse medical and moral considerations.

Since the 1960s, there has been increasing concern about (anti-) doping in sports. As early as 1965, Belgium and France were the first two countries to enact anti-doping (criminal) legislation. Their involvement in anti-doping, however, remained largely symbolic as few athletes were prosecuted for a doping offence. Moreover, from the 1970s onwards, the sporting movement claimed the setting-up of sporting courts to judge its members directly. The Ben Johnson doping scandal at the 1988 Olympics raised public, media and policy attention for the doping problem. France (1989) and Belgium (1991) then enacted new anti-doping legislation focusing more on a disciplinary approach (Hendrickx, 2008). However, the legitimacy of the sports world to curb its problems was seriously called into question after the Festina affair (1998), which progressively revealed a widespread system of doping among elite cycling (e.g. Bassons, 2000; Roussel, 2001; Voet, 1999). The Festina affair then led to a reappraisal of the role of the public authorities in anti-doping affairs (Sallé, Lestrelin, & Basson, 2006). As a consequence, the World Anti-Doping Agency (WADA), composed and funded equally by the sports federations and national governments, was established in 1999 to unify the anti-doping rules and to coordinate the efforts of sports organisations and public authorities (Demeslay & Trabal, 2007; Hanstad, Smith, & Waddington, 2008). WADA soon produced the World Anti-Doping Code (WADC) and promoted a

* Corresponding author. Tel.: +32 486382562.

E-mail address: bertrand.fincoeur@law.kuleuven.be (B. Fincoeur).

surveillance programme which is far from being uncontroversial due to its restrictions to the athletes' privacy (Hanstad & Loland, 2009; Kayser, Mauron, & Miah, 2007). Although the international anti-doping regime that has developed since the 1960s has squarely focused on elite athletes and their testing, there is a growing consensus among policy makers, scholars, and even sportspeople and fans that this approach is not sufficient and should be complemented by additional strategies to tackle the supply-side of the market (Dunn, Thomas, Swift, Burns, & Mattick, 2010; Engelberg, Moston, & Skinner, 2012; Paoli & Donati, 2013).

Today's anti-doping policy therefore leans on three institutional pillars of varying importance: the sports organisations, the public authorities and the law enforcement agencies. The setting-up, the functioning and the activities of the WADA have been analysed (Demeslay & Trabal, 2013; Hanstad, 2009). Several researchers have also studied the anti-doping policies in general (e.g. Dimeo, 2009; Houlihan, 2002; Trabal et al., 2010). However, the implementation and the impact of the three pillars of the anti-doping policy have received little scientific attention. In this article, we will thus provide insight into the impact of anti-doping policy on the market for doping products and we will show how anti-doping policy may inadvertently increase health risks for athletes.

Our research is based on empirical data from an ongoing project about the market for doping products in Belgian and French cycling and the impact of anti-doping policy on the organisation of that market. The research relies, with regard to its data collection process, on a multi-method instrumentation set, including qualitative and quantitative methods¹: (a) the analysis of the policy documents and cases concerning doping use and trafficking in Belgian and French cycling that were initiated by the anti-doping law enforcement agencies; (b) 77 semi-structured in-depth interviews with: 14 policy-makers (representatives of national and international sporting federations, national and international anti-doping organisations), 17 law enforcement officers, 28 active and retired elite cyclists, and 18 other stakeholders (team doctors, sports physicians, team managers)²; (c) surveys administered online to competitive cyclists about the use and the supply channels of doping products, and the attitudes towards the anti-doping policy. Given that it is a very sensitive issue and there could be an important bias of social desirability, we partly used some of the most reliable research methods, i.e. the *Randomised Response Technique* (Lensvelt-Mulders, Hox, van der Heijden, & Maas, 2005; Pitsch & Emrich, 2012) and the *Randomised Count Technique* (Frenger, Pitsch, & Emrich, 2013). A first online survey has thus been administered between May and July 2013 to 2776 competitive Belgian Flemish cyclists, who received directly in their mailbox the announcement of the survey by the Flemish cycling federation. After three reminders, the response rate was 28% (767/2776).³

This article is structured into four parts. In the first part, we detail the three pillars of the anti-doping policy. In the second part, we show that the fight against doping officially relies on two main justification patterns – i.e. health and ethical considerations – but that behind the official grounds other considerations – i.e. moral, political and financial concerns – actually drive the anti-doping policy. In the third part, we analyse the development and the impact of the current trend of the anti-doping policy, namely the increasing focus on the suppliers of illegal PED. We therefore consider whether

the growing involvement in tackling the supply-side of the market does not have unintended and damageable effects on the health of athletes, who nowadays increasingly consider 'non-experts' as possible suppliers. To conclude, we speak in favour of the development of an evidence-based anti-doping policy and we ask whether the anti-doping policy should still be driven from an elite sports perspective, as it is today.

1. A policy based on three unequal pillars

The current anti-doping policy relies on three institutional pillars of varying importance: the sports organisations, the public authorities and the law enforcement agencies. Although the first two pillars still implement the major part of the anti-doping activities, the recent policy developments illustrate the increasing emphasis on the activities of the third pillar, namely the law enforcement agencies.

1.1. The sports organisations

In the case of cycling, the first pillar relies on the national and international cycling federations, the organisers of cycling races, and the cycling teams.

The International Cycling Union (UCI) is responsible for testing the elite cyclists, sanctioning their anti-doping violations and, more incidentally, organising training sessions in order to prevent or deter cyclists from using doping products. By far the major part of the anti-doping activities of the UCI is focused on testing the athletes (urine and blood tests for in- and out-of-competition testing) within the biological passport programme implemented by WADA since 2008 (UCI, 2014). However, one can question the effectiveness of the direct detection methods considering the percentage of positive tests (between 0.2 and 0.5% since 2008) compared to the total tests carried out (more than 12,000 per year since 2008).

The national cycling federations do not carry out any anti-doping test – only UCI and anti-doping agencies are responsible for testing the riders – but they may provide efforts to prevent doping practices such as the signature of ethical charters or information sessions about the alleged health risks of doping products. The attitudes of the national cycling federations are, however, typical of the difficulty for the sports organisations to deal with the doping issue.

I think the sports federations should be totally relieved from organizing such controls. For a good reason: one cannot judge his family. Moreover, I am happy not to have to test myself the riders anymore. Imagine we test (...) positive. I would be under pressure by a lot of people. It has already happened: I received calls from the team, the family... It's very uncomfortable. (André, director of a national cycling federation)

Finally, organisers of cycling races and, most importantly, cycling teams – although some of them played a major role in the development of a doping system in the past few years – are currently taking initiatives to prevent or deter riders from using doping. Nevertheless, the situations still vary from (elite) cycling team to (elite) cycling team (Fincoeur & Paoli, 2014).

1.2. The public authorities

The public authorities – i.e. the national anti-doping organisations (NADOs), which are required to be established for all countries ratifying the WADC – form the second pillar of the anti-doping policy. However, there seems to be considerable variance in the NADOs' institutional bases – i.e. they may be entrusted to the national Olympic committees or to the governments –, composition, and powers (Kamber, 2011).

¹ See Appendix A for further details about the methods used in this study.

² All the pieces of interviews have been completely anonymised. The names are invented. We indicate after each piece of interview the type of interviewee (cyclist, physician, etc.). All the interviews were carried out in French or in Dutch. We have thus translated each piece mentioned in this article.

³ When this article has been submitted, the administration of the survey in France had not yet started.

Due to the complexity of its state organisation, Belgium is one of the few countries that have more than one NADO. Each of Belgium's NADO is linked to its own Ministry of Sports and implements its own anti-doping policy. Indeed, Belgium is a federal state comprising three communities and anti-doping policy is a community competence. As a consequence, the multiple NADOs dilute Belgium's public policy and each brings a differential intensity to the fight against doping in the different Belgian communities. In France, the French NADO (*Agence Française de Lutte contre le Dopage*, AFLD) was set up in 2006 as an independent public agency but it is nevertheless mainly funded by subsidies from the French Ministry of Sports.

The NADOs carry out doping controls during the training sessions and/or during the national, regional and local competitions. They also develop prevention and education programmes but, in both countries, testing the athletes however constitutes by far their largest expense. One NADO director explained:

This year, there is no budget for the prevention. Testing the athletes costs us too much money. In the past, we already made brochures but it does not work. We do that only to have a clear conscience. (Director of a NADO)

Using official figures to estimate the doping prevalence may be questionable. However, one can assume that the anti-doping agencies drive their control activities among the different sports from their suspicions of doping use, which derive from their testing policy. Although cycling is officially not the most infected sport by doping, cyclists are by far the most often tested athletes. Indeed, in Belgium, the average percentage of positive cases for all sports has been between 4 and 6% since 2006 while the anti-doping tests in cycling show a slightly lower prevalence rate (between 1.5 and 5%). In the meanwhile, up to 36% of all tests were carried out in cycling (*Communauté française de Belgique*, 2014; *Dopinglijjn*, 2014). In France too, in 2012, cycling was ranked sixth in terms of percentage of positive results. France's official figures show rugby has a positive percentage more than two times higher than cycling – but anti-doping tests were carried out three times more often in cycling than in rugby (*Sénat français*, 2013).

1.3. The law enforcement agencies

Today, The international anti-doping regime increasingly sees the police and the courts as key allies in achieving its policy objectives. There is actually a growing prominent discourse around aspects of doping as criminal acts (*Houlihan*, 2009) and several international initiatives have been taken to increase the involvement of law enforcement agencies in anti-doping. The 2005 UNESCO Convention against Doping in Sport, for example, calls for states to adopt measures against trafficking and requires them to implement measures to control production, importation and distribution. Likewise, in its White Paper on Sport (2007), the European Commission recommends that the trade in illicit doping products be treated in the same manner as trade in illicit drugs throughout the European Union. In 2008, WADA signed a cooperation agreement with Interpol to show its determination to tackle doping. Finally, the 2013 revision of the WADC increased the sanctions against those who supply illicit PED to athletes. However, while WADA has been very effective in harmonising testing procedures and sports law rules through the WADC, considerable differences remain in the implementation of the third pillar. Indeed, numerous countries still do not have any specific legislation about the trade in doping products (*Donati*, 2007; *Kornbeck*, 2010).

On the one hand, customs enforcement, thanks to their initial seizures of PED, contributes to the fight against the trafficking networks. The opening of the borders in the expanded Schengen area – i.e. the area comprising twenty-six European countries that

have abolished any type of border control in-between their common borders, including the free movement of goods – does not allow a clear overview of the possible intra-European trade in PED but the import of products from outside the EU is the target of customs controls. The internet has been facilitating the access to products since the beginning of the 2000s (*Binsinger & Friser*, 2002; *Dumestre-Toulet*, 2000) and currently acts as a big supermarket for PED from Asia (*Donati*, 2007) – a search on Google using as key words “buy steroids” gave, in July 2014 more than one million results. However, the customs data provide scant information about the market for doping products in (elite) cycling as “we customs are the police of goods. The final user does not interest us” (Paul, customs officer). We may only suppose the trade in PED does not only target the athletes. Indeed, the Swiss customs estimated that, based on the amount of seizures, the amount of Swiss users of PED would roughly equal the whole city of Lausanne, Switzerland's fourth largest city with 140,000 residents in a country of 8 million (*Pasche & Marclay*, 2011).

On the other hand, police and justice officers may prosecute suppliers of illicit PED. In Belgium and France, anti-doping units have been created in the 2000s. However, they have to face a large spectrum of criminal activities (illegal fattening, pharmaceutical crime, etc.). They thus only partly focus on human enhancement in an athletic context. For this reason, the number of police inquiries about doping in (elite) cycling is rather limited and involves a low number of defendants.

Stepping back, it is clear that the three pillars – sport organisations, public authorities and law enforcement agencies – are thus responsible for implementing the anti-doping activities. Although anti-doping efforts are constantly changing, the major initiatives of the anti-doping activities, especially regarding the money spent, are found in the first two pillars. This policy is officially grounded on its two main justification patterns but, as shall become clear in the next part, the situation seems to be much more complex.

2. Which considerations drive anti-doping policy?

Tolleneer and Schotsmans (2013) identify a five-level model of arguments which are used to support the fight against doping, depending on what is at stake: the self (doping should be prohibited because it threatens the health), the other (it reduces the opponent's chances), the play (it undermines the spirit of sport), the display (it creates negative role models) and the humanity (it desecrates human nature). Among these arguments, two justification patterns always support, at least officially, the anti-doping policy: the defense of sports ethics and the protection of athletes' health. These two grounds are nevertheless not stressed identically by the three institutional pillars of anti-doping. Moreover, health and ethical considerations may be used for other purposes than the official motives. Indeed, while moral(istic) and political concerns may emerge behind health considerations, ethical claims of athletic purity are often invoked for political and financial leverage. These financial concerns – which are underpinned by ethical claims – seem to drive most of the anti-doping activities. In this part, we show how health and particularly ethical claims may be used in the anti-doping debate and we demonstrate how the ethical considerations dominate the rationale in the current war on doping.

2.1. The emphasis on health considerations

Undoubtedly, health considerations officially play a major role in driving anti-doping policy. Firstly, both the anti-doping agencies and the sports organisations have developed education programmes in order to prevent doping use, and have produced

literature which specifically emphasises alleged health risks of doping products for athletes (e.g. the information sessions for athletes offered by the sporting federations, the anti-doping leaflets edited by the Belgian NADOs, the ‘anti-doping briefcase’ realised by the AFLD and the French Olympic Committee, etc.). Secondly, more particularly in cycling, the UCI became concerned about doping in the 1990s because EPO was perceived as being much more dangerous than most other PED in part because there were allegedly several deaths in cycling as a result of doping practices (López, 2011; Waddington & Smith, 2009: 130). Thirdly, the alleged danger to athletes’ health is one of the criteria used by WADA to determine which drugs go on the banned list. Finally, in the Belgian and French context, health considerations primarily served as a motive to enforce criminal legislation against dopers as early as 1965.

Actually, Health grounds can be considered as a form of “paternalism” whose objective would be to protect the athletes against themselves (see Houlihan, 2002: 132–134). They would therefore legitimate the anti-doping efforts, in particular the numerous anti-doping tests which are carried out by the UCI and/or the NADOs in order to deter the athletes from damaging their health. Health considerations would also justify the limitations to athletes’ privacy which derive from the application of ADAMS and the biological passport – i.e. the individual electronic record for professional athletes in which profiles of biological markers of doping and results of doping tests are collected over a period of time. Doping violations can therefore be detected by noting variation from an athlete’s established levels outside pre-determined ‘normal’ variation limits rather than testing for and identifying illegal substances. However, although the (mis)use of doping products may cause doping-related deaths or accidents, the noxiousness of the monitored use of doping products is not uncontroversial as the health argument can also be used “to counter viewpoints along the lines that it is precisely in the interest of their health that athletes should be allowed to take supplements of those substances that sporting competitions have drained out of them” (Møller, 2010: 8). Indeed, several doctors representative of the structural ambivalence of the sports medicine (Brissonneau & Le Noé, 2006) are willing to “de-diolize” doping:

When I saw an athlete who had a too low DHEA level after having made an intense effort, I prescribed it to rebalance him because DHEA is vital. Such a prescription is prohibited by the UCI. But between protecting the health of my patient and respecting stupid sports rules, I always made my choice. (Gaston, sports physician)

In the name of “superior principles” (i.e. patient’s health), several doctors, at least in our sample, thus provide doping products to cyclists. Financial incentives should, however, not be neglected as this reasoning also reminds of the techniques of neutralisation that are sometimes used by criminals to reduce guilty feelings (Sykes & Matza, 1957). However, this kind of discourse questions the alleged impermeability between what is healthy or not and between what is ethical or not:

There is clear evidence that, among elite cyclists and high-level amateur cyclists, some injectable products that can be administered in the evening after a competition help to recover and contribute to a better general condition in the long term. Of course, one can argue that they also enhance the next day’s performance. It does not correspond to my definition of doping which could otherwise be applied to the training and to a good sleep! Something enhancing both the performance and the health should not be considered as doping. Only thinkers completely disconnected from real world may defend such hare-brained ideas. The philosophy of anti-doping consists in avoiding everything harmful for the health but it may not attack

what helps the athletes to be healthy – even if those products or methods are performance-enhancing. (Mouton, 2001: 128)

Several scholars also illustrated how the claims concerning alleged health risks of doping may contribute to a “discourse of fear” which then can be used to legitimate the war on doping (Coomber, 2013; López, 2011, 2013). It is noteworthy that, despite the past development of a culture of tolerance towards drugs in elite cycling and the subsequent widespread doping use among elite cyclists for decades, a substantially and significantly lower mortality in participants in the Tour de France, compared with the general male population, has recently been established (Marijon et al., 2013). Furthermore, it may be rather unclear why the scientific progress, on the one hand, is valorised and may enhance the performance of athletes if centred on material (i.e. improving the bikes) or training programmes but, on the other hand, is considered as dangerous and should therefore be prohibited when it concerns the functioning of the human body. The arguments and the discourse about health risks of doping could therefore be analysed as the product of the activity of moral entrepreneurs, who generate or press for the enforcement of norms, based on what they think is moral or ethical (Becker, 1985; Brissonneau, 2003).

Additionally, two empirical elements provide evidence that morally-, ethically- or politically-oriented considerations actually seem to dominate health grounds in the way anti-doping policy is implemented.

First, despite the growing consensus that the prevalence and the seriousness of doping has become higher in recreational or low-level competitive cycling – evidence comes from RRT surveys among German squad athletes where the doping prevalence consistently decreased with an increasing level of competition (Pitsch & Emrich, 2012; Pitsch, Emrich, & Klein, 2007) – elite athletes are though still much more tested than other sportsmen.

Among the top riders, I think the situation is now better. I am sure doping still exists but one could say that they use products under medical supervision with limited health risks. On the contrary, in the ‘masters races’ (= recreational cyclists), it’s awful, it’s really nonsense. I don’t know exactly what they use and how they get the products but today the problem is there. (Dominique, head of a NADO)

No official text however sets proportions for testing sportspeople. The Belgian anti-doping decree, for example, states that anti-doping tests must be realised among sportsmen at all levels but that “a significant part of the tests has to be carried out among elite athletes”. Anti-doping tests are consequently mainly carried out in elite sport while it would be logical to target in priority the levels where doping use is suspected to be the highest.

When we depended on the Ministry of Public Health, it was 50–50. Then we have depended on the Ministry of Sports and it was first 90–10. Finally, we came to 70–30. Actually, for the Minister, we are more visible if we test elite athletes. (Dominique, head of a NADO)

At present, Belgium and France have entrusted the anti-doping policy under the aegis of the Ministry of Sports – in Belgium, it is very clear; in France, indirectly. This political decision seems thus to favour an anti-doping policy driven by other considerations than health ones.

The scarcity, as symbolic as financial, of the prevention and health education programmes in the NADOs’ activities also seems to provide evidence of the relatively low importance of public health issues for the policy-makers. In fact, it may be astonishing to think that the governments seem to consider that preventing alleged health risks of doping for thousands of sportsmen is less important than giving a good image of the country by providing

the impression of drug-free national ambassadors. In the next part, we will also see that the sports organisations have a real interest to offer a virtuous image of elite sport. Consequently, what is the function of the denunciation of individual cases of doping? Testing the athletes and possibly sanctioning the dopers is a standard practice for international sports governance (Mazanov & Connor, 2010). Does the diabolization of sports doping through the emphasis put on alleged health risks of doping for athletes, and the subsequent stigmatisation of dopers as dysfunctioning elements of a virtuous system – including the idea that dopers disrespect their body and the sanctified value of health – therefore not primarily favour both public and sports institutions' interests?

2.2. The emphasis on ethical considerations

Ethical considerations – guaranteeing equal play fields, foiling the cheaters, promoting fair-play, fighting negative role models – form the second major justification pattern to support the anti-doping activities. Even the WADA slogan (*Play True*) or, at a local level, the anti-doping prevention leaflets published by the Belgian French-speaking NADO (*Ma victoire, c'est sans dopage; "My win is doping-free"*) clearly refer to a policy which is intended to stress ethical aspects.

It is worthwhile to say that, these past few years, the cycling world in particular has put a special emphasis on sport ethics. Indeed, despite numerous scandals which occurred during the last two decades, there has been some evidence of a movement to “clean up” cycling from 2007. Concretely, French elite cycling teams started to be factually involved in anti-doping and began to be in favour of a zero-tolerance policy in order to increase their (partially lost) credibility after the Festina scandal (1998) and the subsequent scandals which regularly tarnished elite cycling during the 2000s. They therefore created in 2007 the Movement for Credible Cycling (MPCC). While this movement could have been called ‘clean’ or ‘doping-free’, the symbolic use of the word ‘credible’ clearly evokes sport ethics. Although it was composed of about ten elite cycling teams, the MPCC stayed rather anecdotal until 2012. The decision of several race organisers – not least ASO, the company which organises numerous major cycling races, including the Tour de France – to give priority to – i.e. to select – teams which would join the MPCC, has boosted the movement in so that in July 2014 the MPCC comprised 101 members including 66 cycling teams. However, as stated by Waddington and Smith (2009: 154), there is no coincidence that the riders and other people within elite cycling have begun to articulate the values of fair-play “at a time when the continuing revelations of drug use and the associated withdrawal of sponsors have come to constitute a major financial threat to professional cycling and to those whose careers are dependent on that continued sponsorship”. Indeed, doping scandals may considerably damage elite cycling regarding its commercial activities and even simply its survival. Indeed, between 2005 and 2012, there have been 92 elite cycling teams (UCI World Tour and Professional Continental Teams); some 53 lost their sponsorship – 41 of them within two years (Taverna & Aubel, 2013). The cycling world has thus not suddenly become converted to the cause of ethical sport because it genuinely believed in ethical principles, but because this progressively became necessary to ensure the economic survival of elite cycling. Those who recognise the need to clean up cycling do so not because they are “true believers” in ethical sport but, rather, because they recognise the economic damage to cycling associated with the image of cycling as a sport contaminated by widespread drug use. In that context, sport ethics has not been stressed as a desirable end-in-itself but merely as a means to an end, namely to secure the economic future of cycling. Reference to sport ethics provides an ideological rationalisation for a change of strategy which is notably driven by

financial concerns. Any shift in anti-doping policy within cycling in recent years reflects less a reconsideration of ethical issues as such than a pragmatic response to a changing economic situation involving the withdrawal of sponsors (Waddington & Smith, 2009).

Our interviews clearly reflect the progressive awareness-raising that fighting doping has become necessary to ensure the survival of elite cycling. Keeping and/or involving sponsors by promoting a clean cycling has become essential to make the cycling economy durable.

For me, one should fight doping for the survival of cycling. At the moment, there are 135 riders who do not have a contract for next year. Can you imagine? Doping scandals are responsible for that. All these scandals scared away the investors. Today, we need a better image. Otherwise, there will soon be nobody to fund our sport and in that case, it will mean that we were unable to save it. (Fabrice, team manager)

Fighting doping means thus to take the interests of the corporation into consideration and to show a sense of mutual support. Talking about ethics therefore contributes to defend its own business base and the regaining of the lost credibility goes hand in hand with the promotion of a sport which is supposed to be clean.

I think those who do not try to improve the current situation are egocentric. They want to obtain results regardless of the possible consequences for their mates. They don't realize, or I fear they don't care, that in several cycling teams the sponsor will leave if revealed doping scandals still occur. At a point, one should realize we went too far. (Sylvain, former elite cyclist)

The current emphasis on ethical considerations seems to be simply an instrumentalisation of vague concepts whose use is expected to be bankable. Furthermore, the recent history and the analysis of the culture of doping in elite cycling cast doubt on empirical claims that doping would be necessarily in contradiction to the spirit of sport (Mauron, 2011; Tamburrini, 2006; Volkwein, 1995). Indeed, over decades, elite cyclists have learned to legitimate the use of doping products to the extent of not considering it anymore as a transgression of sports rules but as a component of the profession of an elite athlete (i.e. Brissonneau et al., 2008; Lentillon-Kaestner & Carstairs, 2010). The pharmacology was part of elite riders' everyday life (Brissonneau, 2007; Lê-Germain & Leca, 2005). Its acceptance was due to secondary socialisation (Berger & Luckmann, 1986), which redefined the norms of health and cheating (De Léséleuc & Marcellini, 2005; Lentillon-Kaestner & Brissonneau, 2009). Indeed, to be healthy does not have the same meaning for an elite athlete and for someone doing recreational sport. Although media disapproval of doping started in the 1950s (Perera & Gleyse, 2005) and although riders developed strategies to escape detection (Fignon, 2009), doping was largely accepted by the overwhelming majority of elite cyclists. Doping was thus due to “overconformity” to the norms and values embodied in elite cycling (Coakley & Pike, 2009; Escriva, 2001). Under these conditions, there is clear evidence that the unethical character of the doping use has been imposed from outside the cycling world and that the discourse around sport ethics has been seriously developing only from the 2000s after numerous doping scandals and the realisation that there was no real other option to save cycling (Ohl, Fincoeur, Lentillon-Kaestner, Defrance, & Brissonneau, 2013):

When I was an elite rider, I did the job (= I took products). What I didn't take, I think it's only because I haven't had the opportunity. I have never thought I put my health in jeopardy. Even later. However, I support now the fight against doping because I see young riders who try to make it but, with all the doping scandals, I realize that it is much more difficult than a few years

ago to convince sponsors to invest money in cycling. (Bruno, team manager)

Our survey also provides evidence of elements putting into perspective the idea that doping fundamentally contradicts sports ethics. Indeed, respondents were asked to assess the reasons for which some riders may use a prohibited substance or method. Actually, the lack of sports ethics has been the last factor given by the respondents as an explanation to dope, ranked behind the need for fame or gratitude, the insecurity of the work conditions, the physical difficulty of cycling and the quest for money. It can therefore be difficult in practice to ascertain whether doping use is actually considered by the elite riders as a breach of ethics.

On the other side, the sports organisations face a major dilemma. Indeed, every doping scandal may have serious consequences on the attractiveness of sports for the fans, the media and the sponsors. The involvement in anti-doping policy may thus be necessary if the image of cycling has been publicly soiled by doping scandals but any new revelation can also be largely (financially) counter-productive for the sports world. It can thus be rather unclear whether the sports institutions have a real interest to be involved in anti-doping. Indeed, several sports have already been accused of hushing up the doping scandals in order to protect their reputation (Cazuc, 2007).

It seems clear that the sports organisations have a major interest to emphasise sport ethics. On the other hand, one can also argue that the governments also have an interest in stressing sport ethics but the reason for this objective may substantially differ from the motivation within the sports organisations. Indeed, while the latter need the belief in the integrity of sport as a basis for their economic power – attracting sponsors and media, promoting cycling worldwide – public authorities can gain a twofold advantage from their engagement in anti-doping and their emphasis put on ethics. Firstly, a stable perception of sport as widely clean is a prerequisite to use sport as an instrument for national identification and international representation. Secondly, their involvement in anti-doping can be used to raise their public reputation (e.g. Grix & Carmichael, 2012; Levermore & Budd, 2004; Van Hilvoorde, Elling, & Stokvis, 2010).

Health and ethical considerations are thus the two main justification patterns to legitimate the fight against doping and dopers. Other considerations, however, seem to play a major role. In that context, both health and ethical claims may be instrumentalised in order to satisfy other needs. How can we then interpret the growing development of the activities of the third pillar? And, in particular, what are the possible side effects of this recent shift in anti-doping policy? That is what we further develop in part 3.

3. The increasing focus on the supply-side of the market: opportunities and threats

Today, policy-makers increasingly expand the war on doping to the fight against the suppliers of illicit PED. It is worthwhile to acknowledge that the anti-doping activities of the law enforcement agencies offer an alternative to an approach focusing on the athletes' responsibility. Indeed, individualising the fault of doping allows avoiding explaining the complexity of the numerous pressures athletes have to face. By investigating the supplying networks of doping products, the law enforcement agencies remind us that doping use is rarely only an individual action but rather the noticeable action of a system of which it is the easiest detectable symptom. The "traditional anti-doping policy" – i.e. controlling the athletes within the surveillance programme athletes have to comply with and suspending those who tested positive – creates a sense

of the imminent fulfilment of the sports utopia. While individualising the fault then blaming and ejecting the poisonous elements of the system, the testing-driven policy serves to demonstrate that a come-back to the "original purity" of the sports universe is possible (Chantelat, 2001). We therefore find great merit to a policy which considers the doping issue as the result of social interactions and not only as the individual deviance of a sports worker. However, the current shift in the anti-doping policy raises some important issues regarding the impact on the organisation of the market for doping products. We therefore ask whether the recent developments of anti-doping policy may unintentionally and paradoxically cause harm to athletes.

Actually, the Festina Affair (1998) and the subsequent increasing law enforcement against dopers have had an impact on the organisation of the doping practices. Up until to a few years ago, elite riders often received their supplies directly from their team physicians or trainers and used them under the latter's more or less cautious supervision to minimise health and detection risks (D'Hont, 2007). Doping substances were often bought from complicit pharmacies and/or in countries with laxer regulations and cheaper prices (Voet, 1999).

I have very often seen riders who doped with an EPO-needle. In our team, many did it! There was even EPO in the fridge of the team bus. Being in contact with that product was very common. (Alain, former elite cyclist)

From the 2000s onwards, the acquired legitimacy of doping use among the riders has decreased, especially among the youngest ones (Ohl et al., 2013). Doping has therefore progressively become much more hidden and the formerly major role of the cycling teams in supplying doping products to riders has largely declined. Due to the doping scandals and to the harsher anti-doping policy, the cycling teams have thus been constrained to behave in a different way and to emphasise ethical attitudes for economic reasons (see part 2). Cycling teams are now much less supportive of doping. While most of the elite cycling teams do not support or organise doping for their riders anymore, transversal networks involving several physicians independent from the cycling teams have developed. The Puerto Affair (2006), which concerned many sportsmen (including riders from different cycling teams) who visited a Spanish doctor (Fuentes) to get doping products, illustrated how riders individually found alternative avenues to obtain and consume illicit PED under professional medical advice (Soule & Lestrelin, 2011). The evolution of the supply chains thus mirrors the evolution of the use (Fincoeur & Paoli, 2014).

Usually, there was always a team physician with us during the races. A few years ago, he showed us how to do or he did it himself. Nowadays, the team physician gives nothing. In France, for example, nothing happens. Personally, I have never seen a doping system anymore. If you need something, you have to visit your own physician. (Hector, former rider)

As a new step in the anti-doping policy, WADA has introduced guidelines to help national anti-doping organisations to work more closely with local law enforcement agencies, seeing this as the future of the fight against doping in sport (Paoli & Donati, 2013). The policy of several NADOs, which encourage sports physicians to sign charters by which the physicians are committed to fight doping in sports by all means, may however have some consequences which are the very reverse of those which were intended by the policy-makers. This situation echoes the Voy's (1991) "sad paradox" (cited in Waddington & Smith, 2009: 14), i.e. that aspects of anti-doping policies push athletes towards using drugs which are less easily detectable but more damaging to their health and – this is our addition to the "sad paradox" – under conditions which threaten their health.

Our data undoubtedly confirm the networked athlete theory (Connor, 2009) but they also show that it is increasingly difficult to find a physician who will provide doping products. Indeed, while 20.4% of the respondents declared that someone from the medical staff has ever provided them a prohibited substance or method, only 4.7% identified their current medical staff as possible suppliers of doping products. On the other hand, although 18.2% confessed having ever obtained a prohibited substance or method from a physician out of the cycling team, the latter was more often mentioned than the team physician as a possible supplier (8.3%).

New categories of suppliers, increasingly independent from both the medical and the cycling world, are consequently emerging – ‘someone from outside the cycling world’ is cited as a possible supplier by nearly 1 in 4 riders (24.3%). Medical professionals have therefore, to a certain extent, been replaced by ‘non-experts’ to supply (illicit) PED. The risk that the black market would be the main supplier of doping products among elite riders seems nevertheless to be still limited in practice as the elite riders often need high-level educated experts (i.e. sports physicians) to use PED in the most effective way. Today, however, as the Balco affair showed (Fainaru-Wada & Lance, 2006), there are some indications that professional athletes are (slowly) turning to the “black market” to obtain doping products as opposed to these previous “legal channels”.

As stated above, the anti-doping policy is progressively shifting from a strategy focusing on the end-users (the athletes) to target those involved in the sales and distribution of banned substances in a sports context. As a result, the recent evolutions of the anti-doping policy thus contribute to deter the “experts” (i.e. physicians, soigneurs) from supplying illegal PED.

A few years ago, it was just like if there was no speed control. So everybody ran fast. The products circulated quite openly within the team. (...) Yes, I injected EPO to several riders. Why not? But what happened in 1998 has changed a lot of things. Now, nothing happens within the team. I am sure of it and it is a good thing. Today, if I supply any product to a rider, I would be immediately excluded by the team, there is no doubt about that. (Paul, soigneur)

If anti-doping policy recklessly relies on an increasing law enforcement against the direct suppliers, it is likely that (a) health risks will increase due to the elimination of minimally commercial suppliers with a personal stake in the market (i.e. physicians) and (b) the influence of market-oriented dealers – i.e. people who are not involved in the sports culture but who are only driven by financial incentives – will rise. Actually, there is a risk that anti-doping policy targeting and criminalising “mafia like” organised crime becomes a self-fulfilling prophecy (Fincoeur, van de Ven, & Mulrooney, 2014). Moreover, one should not forget that illegal markets are primarily demand-driven (Beckert & Wehinger, 2011). Except hope that all the athletes will stop considering doping as a possible enhancer, it is unlikely that the market for doping products will be disappearing in the coming years because of the fear of being tested positive (while testing is largely ineffective: e.g. Pitsch, 2011) or to a massive rallying to a virtuous perception of elite sports. On the contrary, the proliferation of the websites where doping products can be bought, the weak control on the quality of the online products sold and the risks that doping practices develop without being monitored by medical professionals do not encourage us to be very optimistic. Consequently, several scholars argue for developing harm reduction policies in sports (i.e. Kayser, 2009; Kayser & Broers, 2013; Waddington & Smith, 2009).

Without fostering the legalisation of all doping products, we wonder whether the recent developments of the anti-doping policy – officially grounded on ethical but also on health reasons – may actually not increase the health risks for several athletes. Of course, one can argue that the fact that access to illicit PED has

been made more difficult implies that several athletes discontinue or perhaps do not start doping practices. There is however still little evidence of that. On the contrary, the impact of the anti-doping policy is in fact (1) to deter medical professionals (the ‘experts’) from supplying, advising, or administering PED to athletes; (2) to drive the doping practices underground; and (3) to involve progressively new categories of suppliers in the doping market, including possible mafia-like market-oriented dealers. If these side effects are unfortunately confirmed in the near future, it would mean that the anti-doping policy may unintentionally and paradoxically cause harm to athletes. We therefore speak – should the “law and order” approach be again expanding – in favour of an evidence-based policy. We therefore draw two conclusions, which are also perspectives for further research.

4. Conclusion

Firstly, while the first two pillars of the anti-doping policy receive (some) scientific attention, the analysis of the anti-doping activities of the third pillar, namely the law enforcement agencies, is still largely neglected by the scholars. Indeed, hardly a few studies have yet specifically focused on the supply-side of the doping market, which remains largely unknown (i.e. Fincoeur & Paoli, 2014; Kraska, Bussard, & Brent, 2010; Paoli & Donati, 2013). The revised WADC (November 2013), which should be enforced by all countries by January 2015, increases the sanctions and the role of the law enforcement officers against the trafficking networks that supply the athletes. This strategy might have a high potential to further increase the clandestineness of the use and of the supply of doping substances as well as to increase the income of suppliers after a market concentration, and to lower the chances to detect doped athletes (Pitsch, Frenger, & Emrich, 2011). Evaluating seriously the impact of the third pillar of the anti-doping policy seems crucial in order to establish an evidence-based policy.

Secondly, as anti-doping policy increasingly targets the supply-side of the market, it is worthwhile to remind that the growing use of PED has become a general trend of our (Western) society, which aims to optimise individual performance at all levels (Ehrenberg, 1991). Indeed, numerous studies have shown that many individuals (e.g. students, porn-stars, politicians) use PED to enhance their performance (i.e. Dodge, Williams, Marzell, & Turrisi, 2012; Greely et al., 2008). Three percent of young adults would have ever used anabolic steroids, a prevalence higher than that of several illegal drugs (Kanayama, Hudson, & Pope, 2010). The phenomenon of a widespread use of potentially harmful PED is thus far from being limited to (elite) athletes. However, if policy-makers consider that doping products may cause harm to athletes, they definitely should draw the same conclusion for all other users. We therefore do think that the priority should be to primarily focus on large-scale public health issues. Large-scale actions like “Operation Pangea” certainly play a major role for the protection of the citizens’ public health, precisely because it does not focus on a specific part of doping users. In this annual international week, coordinated by Interpol, the online sale of counterfeit and illicit medicines is tackled, highlighting the dangers of buying medicines online. When in contrast, the suppliers of doping products are tackled, this may be fruitful on condition that not only traditional suppliers of PED to elite athletes, i.e. people who can offer a high-level medical monitoring, will be targeted.

While doping and the misuse of PED should not be considered anymore as a niche problem, anti-doping policy however remains largely focused on elite athletes. In this article, we have highlighted some of the reasons for which the anti-doping policy is implemented in that way. In particular, we have shown that the current anti-doping policy is to a large extent driven by financial aspects.

After numerous doping scandals over the last twenty years, notably in cycling, and in order to secure the investment of the sponsors in elite sport, the sports organisations but also the governments have emphasised sport ethics and supported the belief in athletic purity. Thus, invoking sport ethics and making it a driving force for anti-doping policy serves the financial interests of those who are directly involved in the sports business. However, going back to the origins of anti-doping policy, doping first emerged and was defined as a public health issue (Dimeo, 2009). The recent trends of the anti-doping policy, which increasingly focuses on the supply-side of the market, could be interpreted as a rebalancing interest for health considerations. But if we adopt a public health perspective, we must ask whether doping in (elite) sports should remain the main entrance door to tackle the misuse and the supply of (illicit) performance-enhancing drugs. In other words, does focusing on doping in (elite) sports necessarily interfere with the public health challenges posed by this phenomenon?

Conflict of interest

The authors have no conflicts of interest.

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Appendix A.

A.1. Methods-section concerning the secondary analysis of documents

The analysis covered policy documents and cases concerning doping use and trafficking in Belgian and French cycling that were initiated by the anti-doping law enforcement agencies.

The objective of this analysis was: (a) to collect data about the supply chains of doping products in cycling (which served as a basis to carry out further interviews); (b) to assess the involvement (amount, type, etc.) of anti-doping agencies in supply-side interventions.

We first analysed the Belgian judicial files regarding doping in cycling since 2000 whose list has been communicated by the Belgian Federal Police. In total, 14 cases have been analysed. In France, the situation was much more difficult as the specialised unit from the French Gendarmerie itself was unable to tell us the amount of cases concerning doping in cycling on a determined time period. Furthermore, the registration system of the French justice does not allow to distinguish or to select the cases concerning doping (in cycling) as this category of facts is included in a much broader category. We therefore carried out case-studies based on information retrieved online, completed by information provided during interviews with French law enforcement officers (convenience sampling).

A keyword analysis was used to analyse the documents.

A.2. Methods-section concerning the semi-structured interviews

The population under study is composed of Belgian and French policy-makers (representatives of national and international sporting federations, national and international anti-doping organisations), law enforcement officers (customs, police, justice), active and retired elite cyclists (World Tour, continental professional and continental cycling teams, i.e. the first three UCI divisions in elite cycling) and other stakeholders (team doctors, sports physicians, team managers, journalists).

In total, 77 interviews have been realised, including: 14 policy-makers, 17 law enforcement officers (customs, police, justice), 28 elite and amateur cyclists, and 18 other stakeholders. To get in touch with the interviewees (in particular, the cyclists and the staff members), we used preferably a snowball sampling technique as such a sensitive topic often requires to be trusted by the interviewees. Some of the interviewees have been interviewed two, three and sometimes even four times, in order to increase the confidence level between the interviewer and the interviewee. Numerous persons however refused to participate in our study (lack of interest, lack of time, fear of the consequences).

The interviews with the cyclists took form of life stories and addressed four main topics: the career in cycling, the environment within cycling (e.g. the relationship between the cyclist and his physician, etc.), the pharmacology (including the possible use of illicit performance-enhancing drugs (PED) and the supply channels by which these illicit PED may be obtained) and the attitudes towards anti-doping policy.

Although a couple of interviews has been tape-recorded then transcribed, most of them were not recorded (first ones because the interviewees did not want to be recorded, following ones after having realised that the recording was “counter-productive” and

inhibited the interviewees). Most of the interviews have therefore been summarised from memory from taken notes.

A keyword analysis was used to analyse the interviews.

A.3. Methods-section concerning the quantitative study

The quantitative study was designed to estimate the prevalence of doping as well as the relative frequency of different supply chains which are used by cyclists. The questions concerning the prevalence of doping were asked using the Randomised Response Technique. The supply chains, which also correspond to socially undesired behaviour and thus are likely to lead to biased answers, were asked using the Randomised Count technique. As this is the first publication to present results from using this technique, we will describe it in more detail before particularising the quantitative study completely.

A.3.1. The RCT to measure the prevalence of multiple embarrassing properties

When asking sensitive or socially undesirable properties in questionnaires, there is a high probability to get biased results (Chang & Krosnik, 2009). In order to deal with this problem, social scientists have developed a bunch of questioning techniques. The first and until now best known technique was developed by Warner (1965). Basing on the original Warner method, there were several techniques developed which overcome some of the problems, associated with this first technique (e.g. Greenberg, Abul-Ela, Simmons, & Horvitz, 1969; Greenberg, Kuebler, Abernathy, & Horvitz, 1971; for an overview see e.g. Lensvelt-Mulders, Hox, van der Heijden, & Maas, 2005). These methods are today summed under the label Randomised Response Techniques. They share the property that the respondent must use a randomisation device when answering the question. As a result, the interviewer will only know the answer but will not know if it originated from the result of the randomisation or if it was an honest answer. These techniques put an increased load on the respondent (handling the randomisation) and even if this process is made as easy as possible for the respondent, there is still the insecurity if the respondent has handled the device correctly and/or if he or she has understood correctly how to deal with the result of the randomisation process.

In recent past, there were some so called non-randomised techniques developed which avoid this insecurity, but nevertheless come with other disadvantages. The Item Count Technique (ICT, sometimes also UCT for Unmatched Count Technique) works with two different subsamples (e.g. Ahart & Sackett, 2004; Dalton, Wim-bush, & Daily, 1994). One subsample is presented a list of innocuous items while the other subsample is offered the same list, completed by one embarrassing item. The respondents then are not asked to answer each question individually but solely to indicate how many of the asked properties they actually have. The difference between the answers in the two subsamples can then be used to estimate the prevalence of the sensitive property. This method comes with the disadvantage, that only half the respondents are asked the question under study while the other respondents are necessary to calculate a “baseline” for the innocuous properties. This is avoided by the SSC-model, proposed by Petroczi et al. (2011), who also ask one embarrassing property and multiple additional properties with known prevalence in the population which additionally should be close to 50%.

A common disadvantage of all these techniques is that they all were developed to ask for one single embarrassing property. In order to measure k properties, the techniques must be used k times. As a result, this leads to a heavy load for respondents and researchers. In case of the RRT, we need k independent randomisation processes (e.g. Himmelfarb, 2004), except we risk to reduce the credibility of the survey (Moshagen & Musch, 2011). When

using the ICT, we would need many additional items for properties which are very likely to be innocuous to the respondents. For the SSC-method, this would be even harder because equally many innocuous items with known distributions in the population under study would be needed.

This led to the development of the Randomised Count Technique, which combines the advantage of non-randomised indirect questioning techniques (like UCT) and of the Randomised Response Technique (RRT). By the same time, it releases the respondent from the need to handle a randomisation device spinner by him/herself thus reducing uncertainty concerning the outcome of the randomisation. The objective for the development of the RCT was thus to develop a technique which enables to measure the prevalence of multiple embarrassing properties simultaneously. Practical examples could be:

- Goods or classes of goods which were stolen by shoplifters.
- Illegal drugs which were used.
- Disciplines where illegal betters had fixed competitions.

A.3.1.1. Basic Idea. Each person shall get a number of sensitive and non-sensitive questions. As answering the sensitive questions can be embarrassing, there is a high risk to get biased results from social desirability of responses. Analogously to the ICT, the respondents do not answer each question individually but solely name the number of properties they have. In order to guarantee a maximum anonymity it is important that the innocuous properties have no extreme (high or low) prevalence in the population.

We developed a catalogue of items for the sensitive questions, which we were interested in as well as a catalogue, consisting of approx. thrice as many non-sensitive questions. The moment a respondent opens the web page with the question, we decided randomly how many and which sensitive questions he will be asked. Subsequently, we also decide randomly how many and which innocuous questions are also asked. The rules for selecting sensitive and non-sensitive questions were:

- at least one and by maximum three sensitive items;
- at least twice as many non-sensitive items as sensitive items;
- sensitive and non-sensitive items sum up to at least 5 and by maximum 10 items.

All questions are presented as a table ordered randomly and only the selected items are visible while the de-selected items are hidden by a graphical pattern. To answer the question, how many of the properties the person actually has, a drop down list is presented which ranges from 1 to the number of visible items. The appearance of the webpage is shown in Fig. A1.

A.3.1.2. Data analysis. The RCT-method can easily be interpreted in matrix-notation. The survey is represented by an $n \times k$ -matrix, where n rows correspond to the number of respondents and k columns represent the total number of items. In the cells of this matrix F , a “1” indicated, that person i was asked item j .

We will name the prevalence of a property j in the population p_j . The unknown prevalence can thus be noted as a k -vector Π . As a result of the survey, we will get an n -vector R which contains the answers of each respondent. Basing on the idea of the expected value, we get the equation

$$F \cdot \Pi = R$$

The prevalence (the unknown vector Π) can be estimated via OLS from the response-vector R and the question vector F :

$$\Pi = F^+ \cdot R, \quad \text{with } F^+ = (F^t \cdot F)^{-1} \cdot F^t$$

Cycling

Lisez attentivement les affirmations qui sont dans les cases lisibles. Indiquez ensuite simplement dans la case située au bas du tableau avec combien de ces affirmations vous êtes d'accord.

J'aime bien la nétabon	J'aime bien quand des gens me reconnaissent quand je mentionne
Je préfère citer tous les vainqueurs du Tour de France depuis 1999	À l'entraînement je préfère rouler seul
Un membre de l'encadrement médical de l'équipe (médecin, kiné, soigneur...) m'a déjà procuré une substance ou une méthode interdite	J'ai eu un pneu crevé lors de mon dernier entraînement
Je préfère les chaussures de cyclisme blanches	J'aime bien écouter de la musique en entraînant
Un autre médecin qu'un médecin de l'équipe m'a déjà procuré une substance ou une méthode interdite	Un coureur (en activité ou retraité) ou un membre de l'équipe (directeur sportif, entraîneur, mécanicien...) m'a déjà procuré une substance ou une méthode interdite
Je mange au moins une banane par jour	Je vais au cinéma au moins une fois par mois
Il m'arrive de rouler en VTT en hiver	Je préfère rouler sous le vent que sous la pluie
Je suis déjà allé dans un stade voir un match de football	J'aime bien regarder des courses cyclistes à la TV
J'ai déjà eu une voiture de couleur rouge	Je préfère m'entraîner sur des routes que le circuit de cash
Jusqu'à l'été dernier au cyclisme j'étais dans une autre discipline qui touche connaissance pharmacien vétérinaire. J m'a déjà procuré une substance ou une méthode interdite	Je lave mon vélo après chaque entraînement

Réponse:

[Explications sur la technique de sondage](#) OK

[Mentions légales](#) [Protection de la vie privée](#)

Fig. A1. Appearance of the RCT-question in the online-survey.

F^* is the pseudo-inverted matrix of the question-matrix F and thus the appropriate means to calculate an OLS-estimator. Assuming that no cheating occurred, we have thus estimated the prevalence of all (sensitive and non-sensitive) properties.

For our question (all in all 20 items while asking by maximum 10 simultaneously), the matrix-notation could look like:

$$\underbrace{\begin{pmatrix} 1 & 0 & 0 & 0 & 1 & 0 & \dots & \dots & \dots & 1 \\ 0 & 1 & 1 & 0 & 1 & 1 & \dots & \dots & \dots & 1 \\ 0 & 1 & 1 & 0 & 0 & 1 & \dots & \dots & \dots & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 & \dots & \dots & \dots & 1 \\ 1 & 0 & 1 & 1 & 1 & 0 & \dots & \dots & \dots & 0 \\ 1 & 0 & 1 & 0 & 1 & 1 & \dots & \dots & \dots & 1 \\ 1 & 1 & 0 & 0 & 0 & 1 & \dots & \dots & \dots & 1 \\ 1 & 0 & 0 & 0 & 0 & 1 & \dots & \dots & \dots & 0 \\ \dots & \dots & \dots & \dots & \dots & \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots & \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots & \dots & \dots & \dots & \dots & \dots \\ 0 & 1 & 0 & 0 & 0 & 1 & \dots & \dots & \dots & 1 \end{pmatrix}}_F \cdot \underbrace{\begin{pmatrix} \pi_1 \\ \pi_2 \\ \pi_3 \\ \pi_4 \\ \pi_5 \\ \pi_6 \\ \pi_7 \\ \pi_8 \\ \dots \\ \dots \\ \dots \\ \pi_{20} \end{pmatrix}}_{\Pi} \\
 = \underbrace{\begin{pmatrix} 5 \\ 2 \\ 8 \\ 1 \\ 0 \\ 3 \\ 3 \\ 2 \\ \dots \\ \dots \\ \dots \\ 7 \end{pmatrix}}_R \dots \Rightarrow \dots = F^+ \cdot \underbrace{\begin{pmatrix} \pi_1 \\ \pi_2 \\ \pi_3 \\ \pi_4 \\ \pi_5 \\ \pi_6 \\ \pi_7 \\ \pi_8 \\ \dots \\ \dots \\ \dots \\ \pi_{20} \end{pmatrix}}_{\Pi} = \underbrace{\begin{pmatrix} 5 \\ 2 \\ 8 \\ 1 \\ 0 \\ 3 \\ 3 \\ 2 \\ \dots \\ \dots \\ \dots \\ 7 \end{pmatrix}}_R$$

Results of Monte-Carlo-Simulations, representing optimal selections for the parameters when using this technique (Frenger, Pitsch & Emrich, 2013) showed that it works nearly equally well independently from the level of prevalence of the properties. Additionally, already for 200 respondents, the mean error of the estimation was below 0.01.

A.3.2. Application of the RCT in our survey

The RRT-questions as well as the RCT-question for the used supply chains were used in an online-survey. It consisted of 11 webpages and contained questions for:

- the perceived doping prevalence among the respondent’s opponents;
- the respondent’s knowledge of possibly doping substance suppliers or supply chains (5 items);
- a newly developed scale measuring attitudes towards doping and anti-doping measures (11 items);
- 2 RRT-questions concerning the lifetime and last year doping prevalence;

- 2 RRT-questions concerning the lifetime and last year prevalence of fraudulently using Therapeutic Use Exemptions;
- One RCT-question concerning four different supply channels for doping methods or substances.

The survey was administered online to competitive cyclists. It has been administered between May and July 2013 to 2776 competitive Belgian Flemish cyclists, who received directly in their mailbox the announcement of the survey by the Flemish cycling federation. After three reminders, the response rate has been 28% (767/2776).

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