Prevalence of doping use in elite sports

Olivier de Hon

Play The Game, 29 November 2017

Contents

- Warming-up
- Methods of assessing prevalence
- Known prevalences in elite sports
- Directions/Conclusions

Important topic; rarely addressed

Epidemiologic approach of doping in sport
A review

P. LAURE

# Important topic; rarely addressed

REVIEW ARTICLE

Prevalence of Doping Use in Elite Sports: A Review of Numbers and Methods

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Maarten van Bottenburg

Starting point of this discussion

"Accurate data on the prevalence of doping use are necessary elements of evaluations of the effectiveness of anti-doping policies."

STRIKING THE RIGHT BALANCE

Effectiveness of Anti-Doping Policies

OLIVIER DE HON

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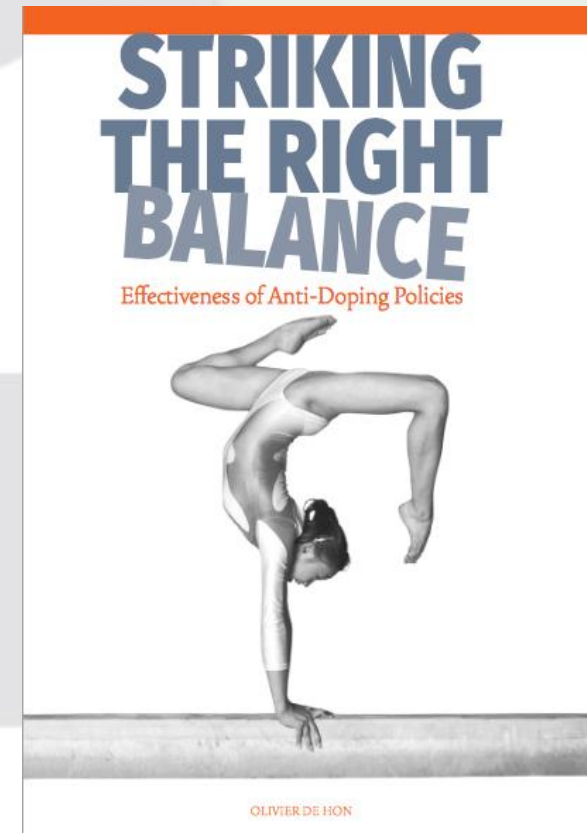
Intentional versus non-intentional

- We will never know for sure
- Big difference in perceived degree of guilt
- Big difference in level of sanctions
- Big difference in preventive approaches

What is the percentage of intentional doping users in elite sports?

Methods of prevalence studies

1. Laboratory-based chemical analyses
   - Doping control test results
   - Population estimates based on biological parameters
2. Questionnaires
   - Standard questionnaires
   - Randomized Response method
3. Inferences from performances
4. Inferences from ego-documents
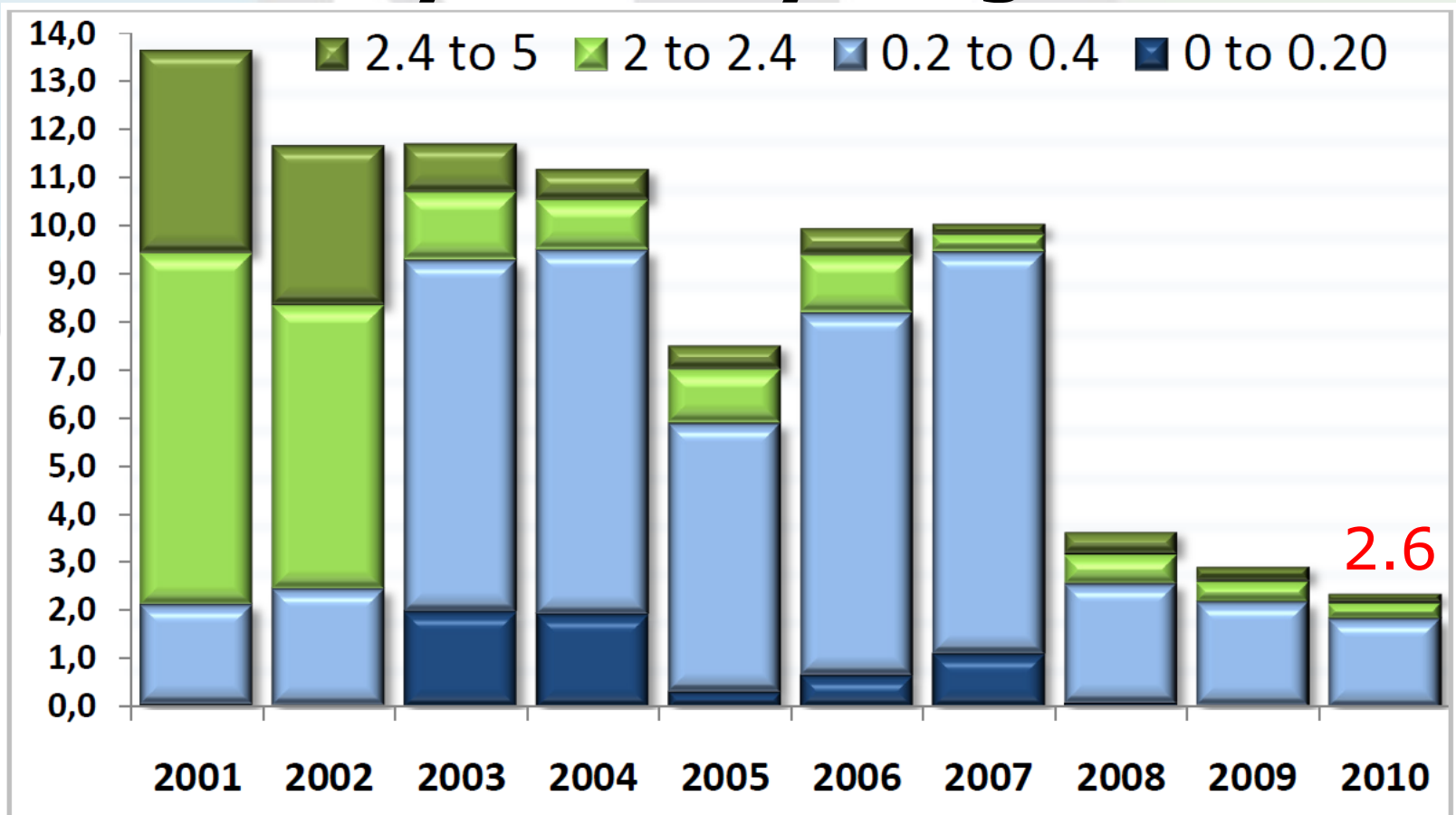
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Doping control test results

Adverse analytical findings (AAFs)

Since 1987: 1.0 – 2.5%

➢ Too low? Not all substances can be found at all times
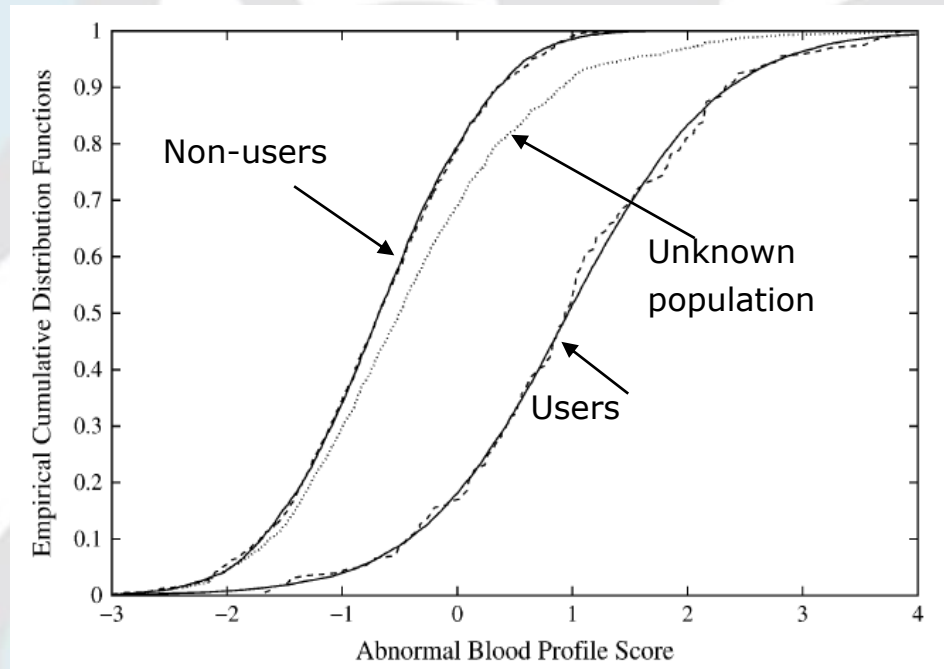
➢ Too high? This includes TUEs and ATFs

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DOPING AUTORITEIT

Reticulocytes in cycling

Population estimates

- Blood profile indicators

(here: 16% estimate of blood-based doping)

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Estimates in elite Track & Field

- Population estimates based on blood values
- Samples from 2001 – 2010
- 7289 samples in 2737 athletes
- Great variation between countries
- Average: 14% (range countries 1-48%)

Source: Sottas et al. 2011

2. Questionnaires

- Straightforward question "Have you ever…":
  - 1-3% of Dutch elite athletes
  - 1-12% of (athletic) students
  - 1-70% if fitness athletes are included

➢ But do they speak the truth?

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Randomized Response Method

- Used in many 'socially sensitive' subjects
- Offers protection by means of deliberate mathematical confounder
- Example:

Have you ever used doping in order to improve your athletic performance?

Simplistic example of RRM

➢ Coin toss (do NOT show outcome to others)

➢ Finger in air when tails & intentional doping

➢ In this example: 20% intentional doping use

In room

100

Randomized Response & doping

Publication (peer reviewed)	Target group	n	Prevalence of doping use (%)
Pitsch et al. 2007	German adult elite	448	26-48 ever; 20-39 last year
Striegel et al. 2010	German junior elite	480	3-11 ever
Simon et al. 2006	Fitness centre visitors	500	8-17 ever
Stubbe et al. 2013	Fitness centre visitors	447	5-23 last year
Ulrich et al. 2017	Elite Track & Field (WC)	1203	39-48 last year
Ulrich et al. 2017	Elite Arab athletes	965	52-62 last year

Publication (non-peer reviewed)	Target group	n	Prevalence of doping use (%)
Duiven & De Hon 2015	Dutch elite (WC/OG/PG) Dutch elite (national)	740 3142	2-9 last year 2-13 last year

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Sources of variation in RR-results

- Choice of 'chance'-element
- Wording of sensitive question
- Methodology of answering
- Behavior of interviewees
- ➢ Target group

So how many?

4.2

14

1.0

DOPING
AUTORITEIT

48

70

2.5

62

18

Summary: prevalence doping use

- Research on this important issue is very rare
- <u>Population-based estimates</u> (based on biological parameters) & <u>Randomized Response</u> give the best estimates
- Highly variable between sport, level, country

Directions for future studies

- More transparancy in passport data (group level)
- Unified approaches for Randomized Response (chance element, questions, etc.)
- Separation of intentional / non-intentional use
- Keep discussions & research going (wastewater, perceptions of doping influence, re-analysis of old samples, …)

Stone cold figures

- 4-62% in various international elite groups
- More to come…

General conclusion

"Tools to evaluate the prevalence of doping use in sports are readily available; they only need to be used more often."

Thank you!

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Dutch elite athletes (OG/PG/WC level)

- Last year intentional use: 4.2% (1.5-8.5%)
- Mostly used: blood manipulations (3.7%)
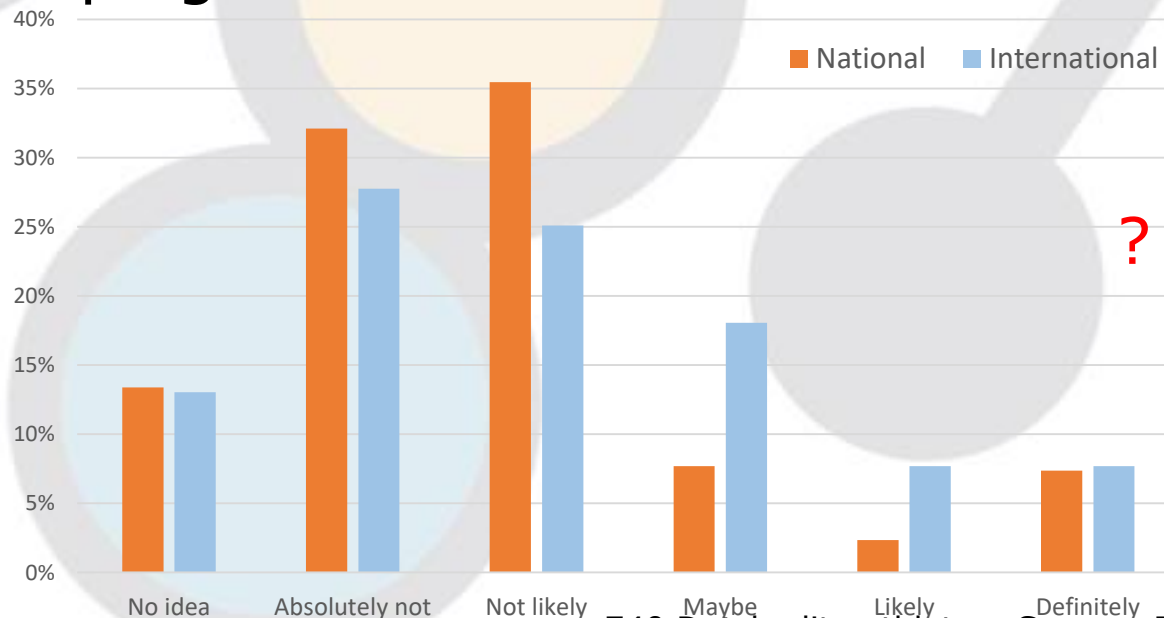- Most frequent combination use: <u>all groups</u>
- There are <u>no </u>ex-users

→ 95.8% is not an intentional user of doping

→ 'cheaters' are persistent

24 **Universiteit Utrecht**

The "Graeme Steel"-question

"In the previous 12 months I have participated in an athletic event where the result was influenced by doping use"

740 Dutch elite athletes; Source: Dopingautoriteit, 2015

Estimating too high = normal?

- According to the 'Availability Heuristic' theory humans will overestimate the chance of something happening that can be recalled easily, but in fact is very rare

Examples:
- Planecrash
- Meningitis
- Doping in elite sports?

Something to think about

- Prevalence of nicotine-use in various sports: 19-56%
- ➤ Are permitted substances used as often as prohibited substances?

Source: Marclay et al. 2011

On 'Population estimates' (1)

- For example: 20 random hemoglobin-values:

A: 13,0; B: 15,1; C: 17,2; D: 13,3; E: 13,6;
F: 16,9; G: 14,3; H: 16,6; I: 13,1; J: 15,5;
K: 15,9; L: 16,3; M: 17,6; N: 16,7; O: 13,9;
P: 17,1; Q: 13,2; R: 17,3; S: 17,5; T: 14,6 g/dl.

On 'Population estimates' (2)

- You list the values in order:
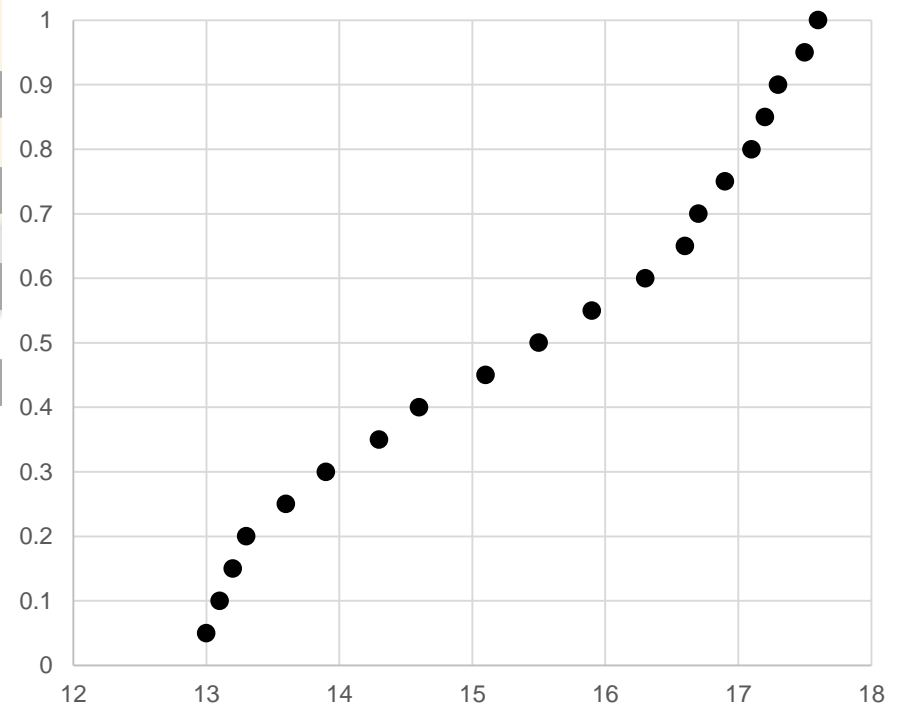
13,0 – 13,1 – 13,2 – 1
13,9 – 14,3 – 14,6 – 1
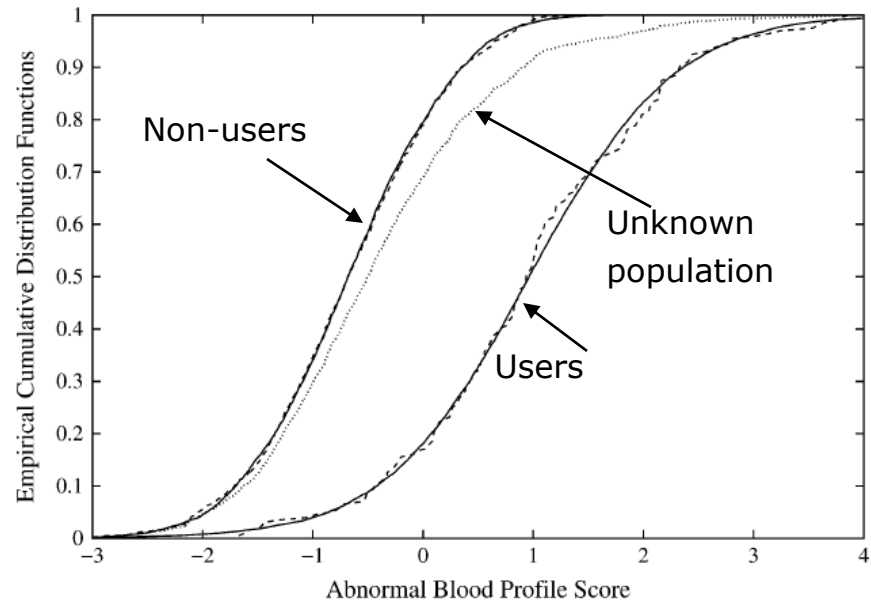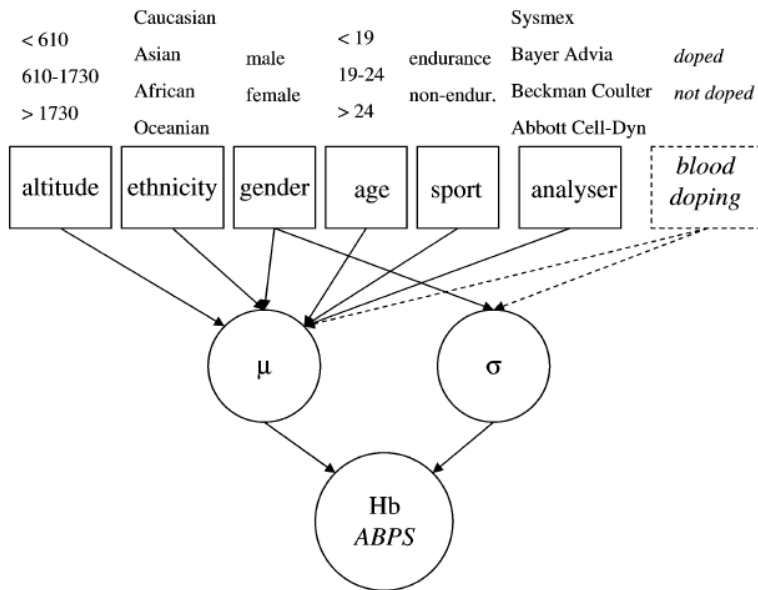15,9 – 16,3 – 16,6 – 1
17,1 – 17,2 – 17,3 – 1

Which yields a graph:

Cumulative Distribution Function

Population estimates (principle)

- Bayesian network

- Blood profile indicators
(Hb, Hct, ABPS, …)

Source: Sottas et al. 2008