

*World Anti-Doping Agency - Social Science Research Program*  
**FINAL REPORT on the project:**

**“Global evaluation of the anti-doping program proposed by  
an international federation”**

Effectiveness, Compliance and Athletes’ Satisfaction





## Social Science Research Program

# FINAL REPORT

“Global evaluation of the anti-doping program proposed by an international federation”

Effectiveness, Compliance and Athletes’ Satisfaction



International Biathlon Union



University of Ferrara

## **RESEARCH TEAM**

### **Principal Investigator**

Fabio Manfredini, MD

International Biathlon Union; Medical Committee

Aggregate Professor, University of Ferrara

### **Co-Investigators**

Lamberti N, BSc, University of Ferrara

Resch N, JD, International Biathlon Union

Malagoni AM, MD Ph.D., University of Ferrara

Caracciolo S, MD, University of Ferrara,

Felisatti M, BSc Ph.D., University of Ferrara

Litmanen H, MD International Biathlon Union

Dal Follo D, MD, International Biathlon Union

Jeannier P, MD, International Biathlon Union

Zhukovskaja L, MD, International Biathlon Union

Carrabre J, MD, International Biathlon Union

### **Research Support**

Martin Kuchenmeister, International Biathlon Union

Lucie Rothauer, International Biathlon Union

Maria Spiridova, MD, University of Ferrara

Christel Zambon, University of Ferrara

Athletes and coaches participating in the study

## Acknowledgements

The study was supported by a grant from the World Anti-Doping Agency – WADA **Social Science Research Grant Program** – and in part by the International Biathlon Union and by the University of Ferrara, Italy.



# CONTENTS

<b>1. Abbreviations</b>	<b>6</b>
<b>2. Executive summary</b>	<b>7</b>
2.1 Background	7
2.2 Aims	7
2.3 Methodology	7
2.4 Results	8
2.5 Discussion	8
<b>3. Introduction</b>	<b>9</b>
<b>4. Design overview</b>	<b>11</b>
<b>5. Procedure</b>	<b>12</b>
5.1 Phase 1: development of the questionnaire	12
5.2 Phase 2: definition and validation of the final structure of the questionnaire	17
5.2.1 Data collection	17
5.2.2 Validation analysis	17
5.2.3 Calculation of items and domain scores	17
5.2.4 Validation	18
5.2.5 Other statistical procedures	19
5.3 Phase 3: evaluation of anti-doping attitudes among elite biathletes	19
<b>6. Results</b>	<b>21</b>
6.1 Phase 1-2 / Objective 1: definition and validation of the final structure of the APPROVE scale	21
6.1.1 Data collection	21
6.1.2 Final structure of the questionnaire	21
6.1.3 Items and domains scores in the population sample	25
6.1.4 Validation	27
6.2 Phase 3 / Objective 2: evaluation of anti-doping attitude among elite biathletes	29
<b>7. Discussion</b>	<b>42</b>
<b>8. Conclusions</b>	<b>45</b>
<b>9. References</b>	<b>46</b>
<b>10. Appendix: the APPROVE questionnaire</b>	<b>49</b>

# 1. Abbreviations

- ADOPT: Anti-DOPing aTtitude
- APPROVE: Anti-doPing PROgram eValuation quEstionnaire
- ENG: English
- GER: German
- IBU: International Biathlon Union
- IF: International Federation
- ITA: Italian
- NADO: National Anti-Doping Organization
- RUS: Russian
- WADA: World Anti-Doping Agency

## 2. Executive Summary

### 2.1 Background

To fight doping in sport, the international federations have expanded their anti-doping programs, increasing the number and type of tests, and adding new duties for athletes. Out-of-competition testing in particular impacts on athletes' daily lives in terms of the frequency of tests, the possible execution at any time of day (even in connection with competitions) and the necessity of providing whereabouts information. The international federations lack any feedback from athletes on athletes' acceptance of and satisfaction with the anti-doping measures. The creation of a tool to evaluate athletes' anti-doping attitudes is the main objective of this 2-year project, supported by a WADA grant – 2011 Social Science Research Program – and conducted by the IBU and the University of Ferrara, Italy.

### 2.2 Aims

The project aimed to:

- Develop an anonymous self-administered anti-doping program evaluation (APPROVE) questionnaire in sport.
- Measure anti-doping attitudes among elite biathletes towards the IBU anti-doping program.

### 2.3 Methodology

The methods involved:

- The creation of a new questionnaire: in the absence of available literature, a team of researchers first identified topics and items (questions) of interest, then developed a preliminary English version subsequently translated into German, Russian and Italian.
- Validation phase: distribution of the questionnaire to a sample group involved in biathlon (technicians, athletes) to define its final structure by factor analysis and to test construct validity, internal consistency and test-retest reliability.
- Distribution of APPROVE among elite biathletes, then analysis of their responses according to the final version to evaluate their attitudes towards the present anti-doping program.

## 2.4 Results

- Sixty-two subjects participated to the validation phase. The final version of APPROVE includes a *Demographics* section, an *Awareness* section measuring respondents' knowledge of the anti-doping rules, and a 36-item section investigating athletes' anti-doping attitudes (*ADOPT*). This section, constituting four 9-item domains (*Safety, Confidence, Acceptance, Satisfaction*), measures the perceived safety against cheating, the confidence in fairness of competitions, their acceptance of anti-doping measures and their satisfaction with the anti-doping interventions.
- The questionnaire had construct validity, moderate test-retest reliability, and good internal consistency.
- Two-hundred forty-four biathletes, representing all elite biathletes, participated in the survey with a response rate of 44.4%. The *Awareness* score was 74.29, with inadequate values for 9% of the respondents. A positive attitude was observed (*ADOPT* score: 64.9), with good to excellent scores for 74% of the respondents. The score domains were significantly lower for *Safety* (58.2) and higher for *Confidence, Acceptance* and particularly for *Satisfaction* (62.6; 67.9 and 70.8, respectively).

## 2.5 Discussion

- Different aspects of the anti-doping attitudes and awareness among athletes can be investigated using APPROVE, a new, properly-developed questionnaire.
- The first implementation of this tool among elite biathletes indicates a population satisfied with the present anti-doping interventions, positively motivated by the anti-doping measures and willing to accept the related restrictions so as to be protected against cheating, safety against cheating being the domain with the lowest score.
- The APPROVE questionnaire, being non-sport-specific, can help international federations to assess athletes' anti-doping attitudes and evaluate the impact of anti-doping strategies.



### 3. Introduction

Most international federations have progressively increased their commitment in the anti-doping field in the last years with the support and coordination provided by WADA. Anti-doping programs have become progressively more composite, including traditional anti-doping tests, blood testing programs, out-of-competition and target-testing programs, and educational programs. This intense activity is aimed at guaranteeing healthy and fair competitions, detecting cheating and avoiding any perceived low level of protection provided by the existing anti-doping programs affecting athletes' reliance with a reactive misuse of drugs.

However, these anti-doping interventions have had some adverse effects on the athletes. The increasing number of out-of-competition tests and their features in terms of invasiveness, frequency, time of execution during the day and possible close connection with the competitions have posed restrictions in athletes' daily activities. As a consequence, these interventions have resulted in an increase in the athletes' commitments and duties, especially for athletes included in the Registered Testing Pool, who are required to provide whereabouts information (1, 2).

Biathlon is an Olympic winter sport that combines cross-country skiing with rifle shooting. In the last years the International Biathlon Union (IBU) has developed studies to safeguard athletes' health, including evaluating competition strain and the rate of musculoskeletal injuries (3, 4). To ensure the fairness of competitions in the anti-doping field, the IBU has monitored athletes' blood profiles by means of a blood testing program (5, 6) and developed software favoring surveillance and timely testing of athletes on the basis of abnormal hematological and performance patterns (7, 8). After developing a composite anti-doping program, the IBU has aimed to collect feedback from athletes regarding these interventions, bearing in mind that for an anti-doping policy in a sport federation to be successful, there needs to be an agreement between those testing and those tested that those being tested accept the limitations imposed to gain the 'advantage' of fair competitions. Therefore it would be interesting to assess how athletes perceive the balance of advantages and disadvantages. In addition, athletes should not only be considered 'targets' of the anti-doping measures, but as both customers satisfied with a service (the anti-doping program offered by their federations) and workers who feel safe in their work environment (i.e. protected against cheating and physical harm caused by the use of doping agents). Unfortunately the anti-doping programs, generally evaluated in terms of budget or number of controls, lack feedback from athletes in terms of satisfaction, perceived safety of the anti-doping actions and impact on athletes' daily lives. Moreover, there has been little research on these questions, and on anti-doping attitudes in general (9). Previous studies in the anti-doping field aimed mainly to collect information on athletes' doping attitudes, e.g. by evaluating the factors influencing athletes' decisions to use performance-enhancing drugs or athletes' perceptions of doping in

sport; or aimed to evaluate information requirements, e.g. investigating athletes' level of knowledge about prohibited substances and awareness and knowledge of anti-doping policy and testing procedures or analyzing the effectiveness of a sport's anti-doping education program (10-18).

The present project, conducted by the IBU and supported by WADA, aimed to develop a new tool for use by international federations to evaluate athletes' attitudes towards the anti-doping programs in terms of satisfaction with the measures and services offered, perceptions of safety in terms of fair competitions, and acceptance of the anti-doping interventions.

The objectives of the project are in particular:

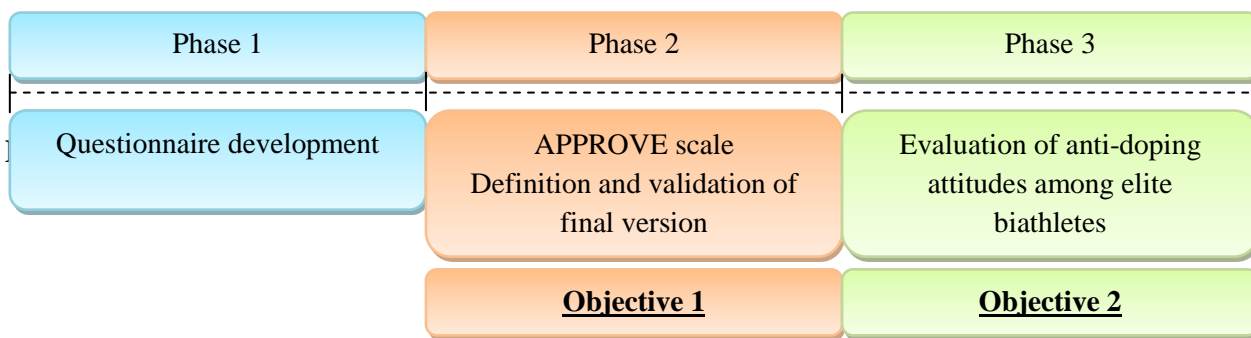
- 1) to develop and validate an anti-doping program evaluation (APPROVE) questionnaire including a score to measure athletes' anti-doping attitudes (ADOPT) and
- 2) to evaluate the attitudes of top-level athletes participating in international IBU competitions towards the anti-doping programs imposed by their international federation.

The information collected in the present project might allow future anti-doping strategies to be designed in order to attain a high level of athlete satisfaction and cooperation.

## 4. Design Overview

The project consists of three phases:

- 1) development of an anonymous, self-administered questionnaire to collect feedback from athletes on their anti-doping attitudes;
- 2) definition of the final structure of the APPROVE scale and validation study using a sample of coaches and athletes from different nations involved in biathlon and
- 3) distribution of APPROVE among a population of elite biathletes with analysis of the results according to the final version in order to measure the anti-doping attitudes in biathlon. The three phases of the project are summarized in Figure 1 below.



*Figure 1*

A preliminary phase was devoted to the creation of the study protocol, to the positive submission to the principal investigator's local ethics vetting committee and to the revision by the WADA Ethics Committee prior to obtaining final approval.

## 5. Procedures

### 5.1 Phase 1: development of the questionnaire

A team of researchers was established, with members from six different countries (Italy n= 5, Russia n=1, Germany n=1, France n= 1, Finland n= 1, United States of America n= 1). The team included a psychiatrist, a sports law expert, medical doctors specializing in sports medicine, and sports science and biathlon experts. Discussions among the members of the study group were held during meetings and by teleconference or email.

The analysis of the literature confirmed the lack of tools to measure the athletes' anti-doping attitudes. In order to develop proper questionnaire design guidelines, the research team considered principles and related tasks (19, 20). The first stage was to generate a list of topics to be covered by the questionnaire. In absence of information from published reports, qualitative research was used to identify the concepts to be explored, mainly based on unstructured, informal conversations held by researchers with athletes and technicians in relation to the anti-doping issues. This procedure allowed the researchers to identify specific themes: concerns and feelings reported by athletes and coaches about anti-doping problems such as the sense of safety in terms of fairness of competitions and protection from cheating that an anti-doping program should ensure; the satisfaction with the number and quality of the anti-doping interventions (rules, procedures, services, etc) offered by the international sporting environment and by the international federation; and the degree of acceptance of possible limitations on the quality of life posed by the anti-doping rules and interventions. In addition to these three hypothetical sub-scales measuring aspects of athletes' anti-doping attitudes, athletes' *Awareness* of anti-doping rules and interventions posed by the international federation under evaluation was also considered important enough to warrant investigation through specific questions. For the same reason a *Demographics* section was also considered important. This section, differing in some items between athletes and technical personnel, should include information not affecting the respondents' anonymity but related to gender, age (range), experience in competitions (for athletes and coaches), the position on the team, and previous participation in competitions organized by other federations. An open question was also added so that respondents could suggest improvements to the present anti-doping interventions.

In a similar manner as that used to identify the main domains relating to anti-doping attitudes, a list of statements potentially relating to each domain was produced and progressively reduced in number to exclude redundant items (questions) dealing with less relevant topics. For each question, the wording, brevity, terminology, and meaning were carefully considered. Items were also adapted for use with the

selected response format. Closed-ended questions were preferred on account of their relative advantages (19), based on a five-point Likert agree-disagree response scale (strongly disagree, disagree, neither agree nor disagree, agree, and strongly agree) (21).

Items dealing with athletes' *Awareness* were derived from the WADA Code or from questions most frequently posed by athletes and coaches during the anti-doping education seminars. For these items, a dichotomous response format (agree/disagree) was used.

In the validation phase, three items from the *Lie* scale were added to evaluate the desirable responding bias (22). To reduce possible responding biases, items where agreement reflected a negative attitude were included. The questions were randomly placed throughout the questionnaire regardless of the domain.

An English version was preliminarily developed. The final version was translated by a professional translator and checked by all researchers. Once approved, the English version was translated into German, Russian, and Italian and each version was carefully checked by the members of the team who were native speakers of the respective languages to evaluate wording, terminology and meaning. The summary of Phase 1 is shown in Figure 2 below:

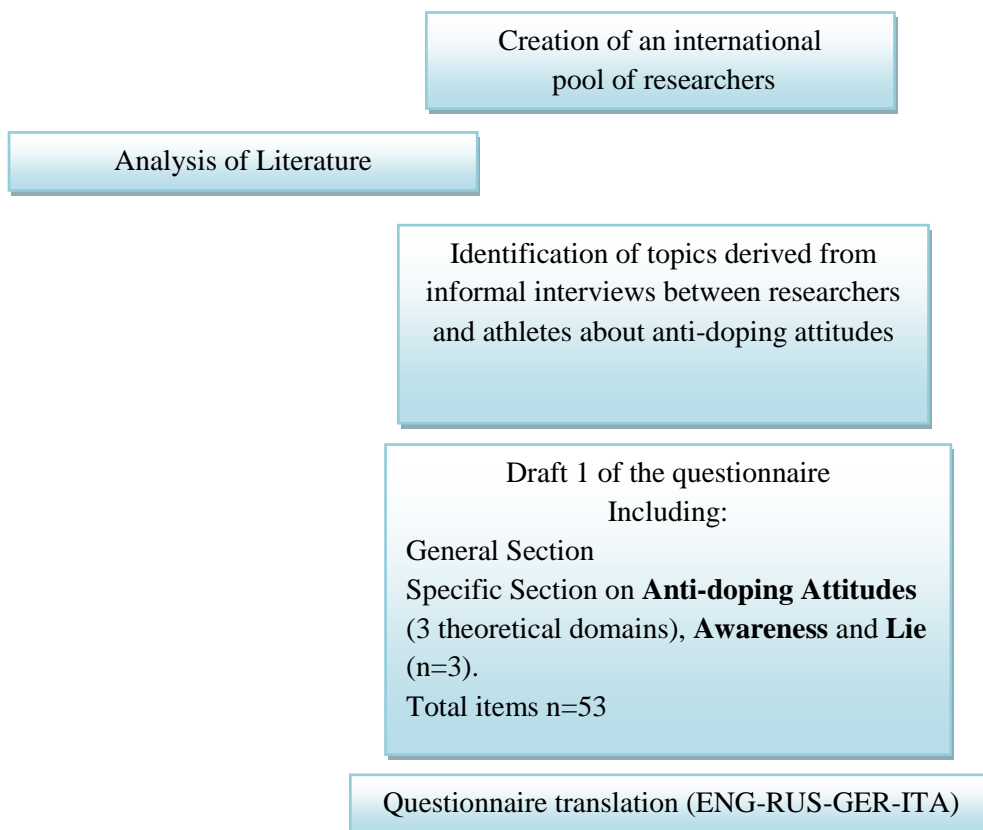


Figure 2

The questionnaire layout was designed to be clear and easy to follow. The first draft (English version) of the questionnaire distributed for validation is as follows (Figures 3a, b, c, d, e, f below)

General Section (Athlete)				General Section (Technical personnel)			
Sex	<input type="radio"/>	<input type="radio"/>		Sex	<input type="radio"/>	<input type="radio"/>	
	Male	Female			Male	Female	
Age	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Age	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	< 20 yo	20-28 yo	> 28 yo		< 35 yo	35-50 yo	> 50 yo
Years of participation to IBU competitions:	<input type="radio"/>	<input type="radio"/>		Function	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	< 5	> 5			ski technician	coach trainer team leader	physician physiotherapist
Years of participation to IBU WORLD CUP competitions	<input type="radio"/>	<input type="radio"/>		Former athlete in IBU competitions	<input type="radio"/>	<input type="radio"/>	
	< 3	> 3			Yes	No	
Years of participation in Biathlon (not IBU)	<input type="radio"/>	<input type="radio"/>		Years of participation at IBU competitions	<input type="radio"/>	<input type="radio"/>	
	< 5	> 5			< 5	> 5	
Previous sanctions for anti-doping reasons	<input type="radio"/>	<input type="radio"/>		Years of participation at IBU WORLD CUP competitions	<input type="radio"/>	<input type="radio"/>	
	Yes	No			< 3	> 3	
Previous participation in competitions of a different international federation	<input type="radio"/>	<input type="radio"/>		Years of participation in biathlon (not IBU)	<input type="radio"/>	<input type="radio"/>	
	Yes	No			< 5	> 5	
If yes, which federation? (answer optional)	_____			Previous participation in competitions of a different international federation	<input type="radio"/>	<input type="radio"/>	
	_____				Yes	No	
If you were in charge of your federation's anti-doping program, what would you do to make it better? (answer optional)	_____			If yes, which federation (answer optional)	_____		
	_____				_____		
	_____			If you were in charge of your federation's anti-doping program, what would you do to make it better? (answer optional)	_____		
	_____				_____		

Fig. 3a

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Disagree Strongly
1 The prohibited list of the World Anti-Doping Agency is updated every year		<input type="radio"/>		<input type="radio"/>	
2 In the case of a non-negative sample, I believe that the result management process (anti-doping administrator, hearing panel, CAS...) (of my international federation) safeguards the athlete	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3 It is reasonable (for health, possible manipulations etc.) to restrict athletes from starting if their blood values exceed the competition limits	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4 The present anti-doping rules of my international federation safeguard health and fairness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5 I always practice what I preach		<input type="radio"/>		<input type="radio"/>	
6 I have never read the anti-doping rules of my international federation because they are difficult and should be explained to me by an expert		<input type="radio"/>		<input type="radio"/>	
7 I fear that my personal information that I give during the anti-doping control will not be kept confidential	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8 The fact that the national and international anti-doping organizations work in coordination with each other is beneficial to the athletes because it improves the anti-doping system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9 The international competitions in my sport are clean in terms of doping	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10 I feel that the medical committee of my federation is effective in maintaining a safe environment without doping	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11 The athlete biological passport, noting variances in the profile of an athlete's biological markers over a period of time, increases the possibility to detect doping violations in my sport	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12 An athlete can be sanctioned for doping only if his/her biological sample is positive at the anti-doping control		<input type="radio"/>		<input type="radio"/>	
13 I feel that the athletes at high risk of unfair behavior are rarely controlled by my international federation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Fig. 3b

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Disagree Strongly
14 The athlete's duty is only to compete and not to undergo medical anti-doping controls	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15 The mixture of anti-doping tests and educational programs of my international federation is effective	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16 The prohibited list of the World Anti-Doping Agency and the sanctions for positive athletes are different for each international Olympic sport federation		<input type="radio"/>		<input type="radio"/>	
17 Athletes who are not guilty can be wrongly disqualified	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18 The anti-doping controls are necessary for ensuring fairness of competitions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19 The anti-doping tests performed by my international federation are current and up-to-date for all doping agents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20 Non ho mai sottratto qualcosa, anche di nessun valore, che appartenesse a qualcun altro		<input type="radio"/>		<input type="radio"/>	
21 My federation is a provider of high-quality products in the field of anti-doping	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22 Blood tests should be not performed on athletes of youth categories	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23 Nobody cheats in my sport	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
24 The athlete has both duties and rights during the anti-doping control		<input type="radio"/>		<input type="radio"/>	
25 It is impossible to fight doping in sport because new substances and methods that improve performance and that cannot be detected are continually available	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
26 The anti-doping controls interfere in athletes' training in an adverse way	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
27 The international federation I belong to is interested in the world anti-doping policy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Fig. 3c

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Disagree Strongly
28 The attempted use, the possession or trafficking of products included in the prohibited list of the World Anti-Doping Agency are a severe violation of anti-doping rules and call for a sanction to the athlete or to the technician involved		<input type="radio"/>		<input type="radio"/>	
29 I do not trust anti-doping controls managed and performed by my international federation because positive cases are rarely detected in my sport	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
30 It is right (reasonable) to undergo blood testing before competitions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
31 There has been an improvement in the anti-doping controls performed by my international federation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
32 I have never cheated at a game		<input type="radio"/>		<input type="radio"/>	
33 The number of out-of-competition anti-doping controls performed by my international federation is sufficient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
34 I believe that is right to restrict the daily activities of those athletes included in the registered testing pool by way of the athlete whereabouts requirement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
35 I fear that the urinary sample collected during the anti-doping control can have doping agents added by someone else	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
36 My national federation and/or my national anti-doping organization (NADO) have explained to me the anti-doping rules of my international federation		<input type="radio"/>		<input type="radio"/>	
37 According to the WADA code, it is each athlete's personal duty to ensure that no prohibited substance enters his or her body		<input type="radio"/>		<input type="radio"/>	
38 The number of in-competition anti-doping controls performed by my international federation is sufficient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
39 The anti-doping program of my international federation maintains a safe environment in terms of fairness of competitions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
40 I do not believe in anti-doping controls because they can be easily manipulated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Fig. 3d





## 5.2 Phase 2: Definition and validation of the final structure of the questionnaire

### 5.2.1 Data collection:

Officials and athletes were notified of the pending study before the start of the season by means of a letter inviting them to participate in the study. Two teams of researchers provided explanations during various international IBU events to athletes and coaches and promoted the submission of the questionnaire. All subjects at the venue received an information letter, an informed consent form to be signed if they agreed to participate, then a copy of the questionnaire with the request to return them within three days.

### 5.2.2 Validation analysis

For the validation analysis, the first draft of the questionnaire (*Figs 3 – 4 a, b, c, d, 5*) was distributed to 132 respondents (including technical staff) from the nations present at the venues (for a maximum of three per nation, regardless of their position in the team) and some athletes. Informed consent forms and questionnaires were collected in two separate boxes available in the meeting room at the venues.

The final version of the APPROVE scale was derived from the analysis of the returned questionnaires. The validation phase and the calculations were conducted by a single person not involved in the development of the scale.

The number of domains to be considered, the final selection of the items and their division into domains were obtained using factor analysis, a statistical method of determining whether groups of items are related to each other and how many groups are derived from the proposed items. A principal component factor analysis using Varimax rotation was performed, considering any factors with eigenvalue greater than 1.1 worthy of inclusion within the scale (**23**). The analysis was performed using SPSS 21 (SPSS Inc, Chicago, IL, United States) and AMOS 21 (IBM, Armonk, NY, United States)

### 5.2.3 Calculation of items and domain scores

The domain scores were derived by coding the item response on a scale from 0 for "strongly disagree" to 4 for "strongly agree". In order to favor the analysis these values were multiplied by a constant factor to reach a theoretical maximal item score equal to 100. The final values set (strongly disagree = 0, disagree = 25, neither agree nor disagree = 50, agree = 75 and strongly agree = 100) were added to produce a total score for each domain and transformed into a mean grade corresponding to a percentage of the maximal theoretical score (100). The mean score value of the *ADOPT* section, derived by adding the raw scores for questions within the four domains, was planned to represent each athlete's global anti-doping attitude (*ADOPT* score).

According to the score, the levels of attitude for the *ADOPT* section and for each domain were arbitrarily set as insufficient ( $\leq 50$ ), sufficient (51-60), good (61-80) and excellent (80-100).

In the section *Awareness* and for the *Lie* scale questions, a score of 0 (disagree) to 100 (agree) was applied. For items where agreement reflected a negative attitude (Likert type format) or an incorrect answer (dichotomous format) by the respondent, the score scale was reversed (0 for agree and 100 for disagree).

For any data missing in the questionnaire, the value of the central neutral category on the Likert scale (i.e. 50 on the coding of 0-100) was assigned. In questions with dichotomous format, a value equal to 0 was assigned, this option reflecting insufficient knowledge.

#### 5.2.4 Validation

The validity of APPROVE was tested. Criterion validity, in the absence of a gold standard to evaluate the original concepts under study, was not assessed. Construct validity, i.e. the ability of the tool to measure an abstract concept, was tested by comparing the *ADOPT* score with a single item of satisfaction. A question was purposely included in the final page of the questionnaire; the interviewees were asked to evaluate their level of overall satisfaction with the anti-doping measures posed by their international federation (see *Figure 3f* above) by giving a number from 1 (low level) to 5 (high level). The correlations between *ADOPT* score-related domain scores and the global indicator of satisfaction were determined using the Spearman's rho correlation coefficient.

The reliability of APPROVE, i.e. the capacity of the questionnaire to produce consistent results, was tested by administering the same scale on two different occasions, approximately two weeks after the first interview, on a group of twelve subjects including coaches and athletes of different nationalities and languages. For this reason each respondent was asked to create and memorise an alpha-numerical code and write it on the final page of the questionnaire, to be able to match the two questionnaires to the same respondent in case of re-administration of the scale. Repeatability of the *ADOPT* score was assessed by testing the scores obtained in the two trials on all the 36 items contributing to the *ADOPT* score. The evaluation was performed by calculating both the Spearman's rho correlation coefficient and the Cohen's Kappa (24), a chance-corrected measure of agreement, with values defined as poor ( $<0.20$ ), fair (0.21 - 0.40), moderate (0.41 - 0.60) and good (0.61 - 1.00). Inter-rater reliability was not tested, being a self-compiled questionnaire. The internal consistency, or the measurement of the same concept by different scale items, was evaluated in the returned questionnaires – for the domains relating to anti-doping attitudes – using Cronbach's alpha, with values between 0.7 and 0.9 considered as optimal. Statistical calculations for the validation process were performed using Medcalc 12.4.0 (Medcalc Software, Mariakerke, Belgium).

#### 5.2.4 Other statistical procedures

Since the items were scored using an ordinal scale and most of the distributions were asymmetrical, non-parametric statistical procedures were used (as appropriate) with significance level set at 0.05.

The stages of the questionnaire validation are reported in Figure 4 below.

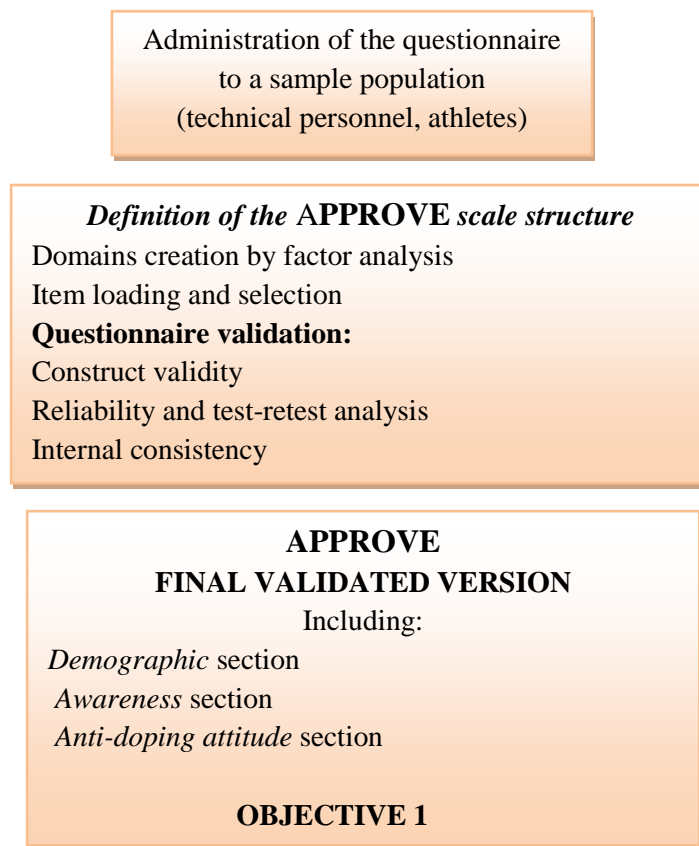


Figure 4

### 5.3 Phase 3: Evaluation of anti-doping attitudes among elite biathletes

As previously reported, two teams of researchers provided explanations to athletes and promoted the submission of the questionnaire during international IBU events at the same venues.

550 athletes at the venue received an information letter, an informed consent form to be signed if they agreed to participate, then a copy of the questionnaire with the request to return them within three days. Informed consent forms and questionnaires were collected in two separate boxes available in the meeting room at the venues.

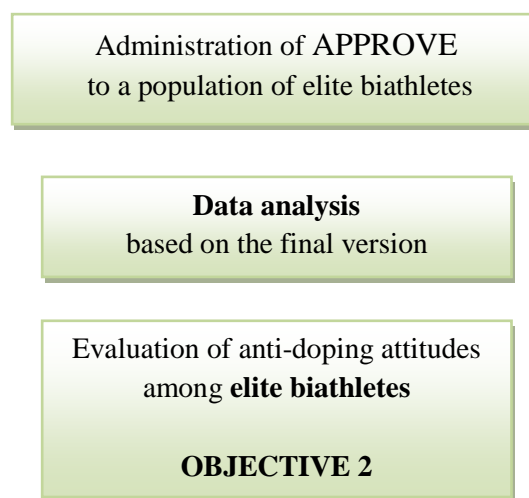
The validity of the study in terms of the volume of the questionnaires collected in relation to the number of questionnaires distributed was evaluated according to the power analysis ([www.raosoft.com](http://www.raosoft.com)), assuming a response distribution of 50% with a margin of error of 5% and a confidence level of 95%. The sample size required to make the study valid was 227. The sample size able to represent the whole population of elite

biathletes participating in IBU competitions, evaluated on the basis of a maximum number of potential interview subjects of 650 athletes registered for participation in IBU competitions, was 242.

The score values obtained are presented as mean  $\pm$  standard deviation. The distributions of responses are compared for each item. The differences between domain scores in the categories of respondents (age, gender, language) were tested using the Kruskal-Wallis tests.

As an additional information tool, each specific federation's score can be obtained by assessing the items strictly related to the IF under examination.

The stages of the evaluation of the anti-doping attitudes among elite biathletes are reported in Figure 5 below.



*Figure 5*

# 6. Results

## 6.1 Phase 1-2 / Objective 1: definition and validation of the final structure of the APPROVE scale

### 6.1.1 Data collection

Sixty-two questionnaires were collected. The *Demographics* of the population sample are reported Table 1.

Twenty-one questionnaires did not have any value missing, and there were only 45 data missing out of a total of 3100 items (0.01%). A maximum of 8 missing values per questionnaire were found without a critical item identified for most missing values (maximum 4 per item). All the questionnaires were therefore considered suitable for analysis. No questionnaires were found that were affected by the extremity bias.

### 6.1.2 Final structure of the questionnaire

The final version of APPROVE includes a *Demographics* section, an *Awareness* section and the *ADOPT* section. The structure of the questionnaire and aims are summarized here in Figure 6:

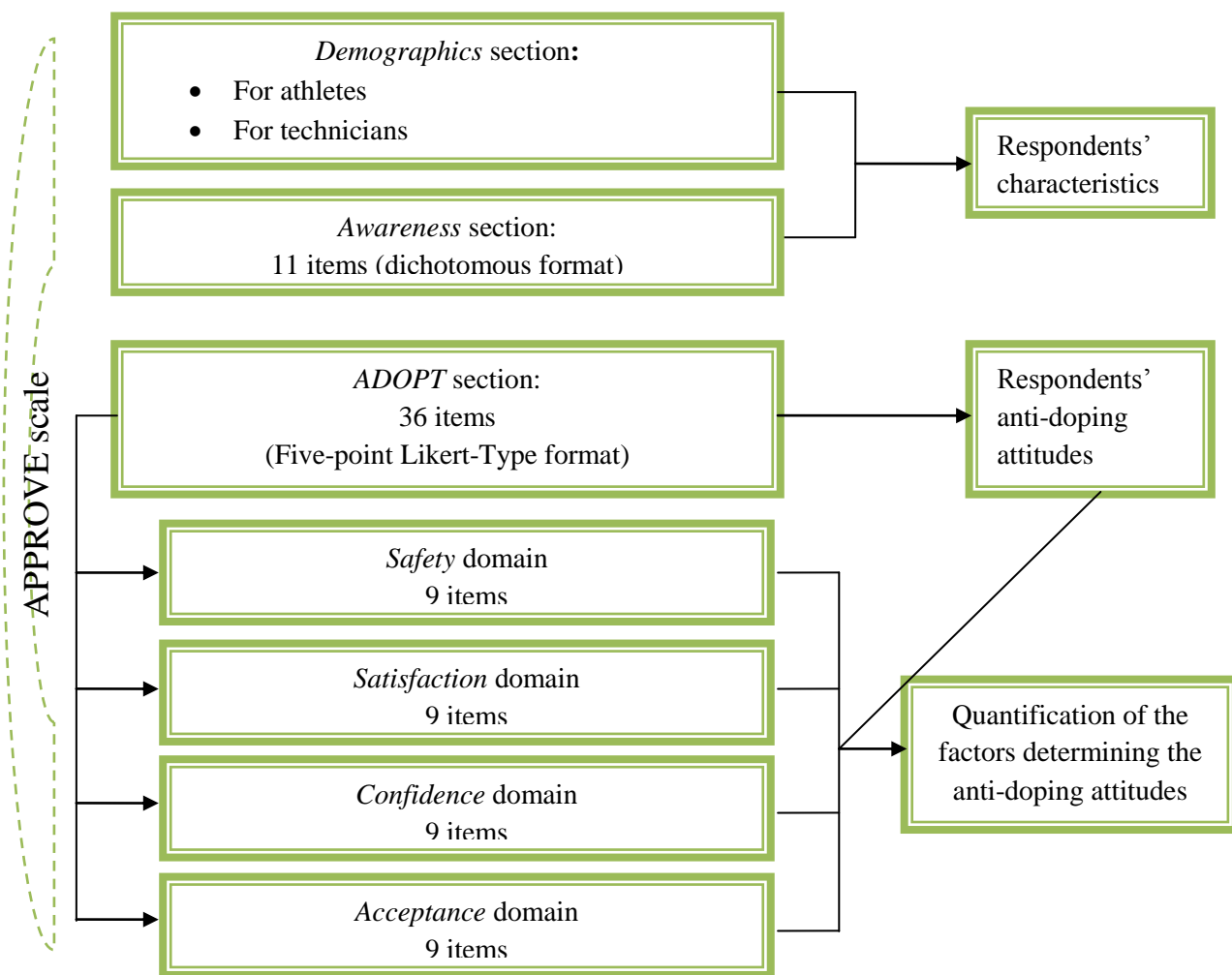


Figure 6

In the section *Demographics* the 62 respondents (56 males) included athletes (n=5) and technical personnel. The characteristics of the respondents and of the questionnaires collected are detailed in Table 1 below.

<u>Variable</u>	<u>Group</u>	<u>n</u>	<u>%</u>
<b>Gender</b>	Male	56	90
	Female	6	10
	<b>Total</b>	<b>62</b>	<b>100</b>
<b>Age</b>	≤35	30	48
	35-50	25	40
	≥50	7	12
	<b>Total</b>	<b>62</b>	<b>100</b>
<b>Position</b>	Athlete	5	8
	Coach	44	71
	Physician – Physiotherapist	5	8
	Ski-men	8	13
	<b>Total</b>	<b>62</b>	<b>100</b>
<b>Former Biathlete</b>	Yes	32	56
	No	25	44
	<b>Total</b>	<b>57</b>	<b>100</b>
<b>Participation in IBU competitions (Years)</b>	<5	30	48
	≥5	32	52
	<b>Total</b>	<b>62</b>	<b>100</b>
<b>Participation in IBU World Cup competitions (Years)</b>	<3	27	48
	≥3	29	52
	<b>Total</b>	<b>56</b>	<b>100</b>
<b>Participation in national biathlon competitions (Years)</b>	<5	16	28
	≥5	42	72
	<b>Total</b>	<b>58</b>	<b>100</b>
<b>Participation in competitions of other international federations (Years)</b>	Yes	17	30
	No	39	70
	<b>Total</b>	<b>56</b>	<b>100</b>

Table 1

Table 2 below shows the languages of the questionnaires collected.

<u>Variable</u>	<u>Group</u>	<u>n</u>	<u>%</u>
<b>Questionnaire's language</b>	English	38	61
	Russian	8	13
	German	9	15
	Italian	7	11
	<b>Total</b>	<b>62</b>	<b>100</b>

Table 2

The *Awareness* section includes 11 items and investigates knowledge/awareness of both anti-doping rules specifically involving athletes (e.g. rights and duties in terms of anti-doping) and of the type and quality of interventions carried out by the international federation under evaluation. In this section a score of  $76.1 \pm 13.7$  was calculated for the sample group, with two questionnaires reporting an insufficient level of awareness (score <50). The results of the *Awareness* section collected among technical personnel and athletes in the validation phase are shown in Table 3.

Section	#	Question	n	Mean	SD	Section mean
<b>AWARENESS</b>	1	The prohibited list of the World Anti-Doping Agency is updated every year	62	98.4	12.7	<b>76.1</b>
	6	I have never read the anti-doping rules of my international federation because they are difficult and should be explained to me by an expert	62	69.4	46.5	
	12	An athlete can be sanctioned for doping only if his/her biological sample is positive at the anti-doping control	62	32.3	47.1	
	16	The prohibited list of the World Anti-Doping Agency and the sanctions for positive athletes are different for each international Olympic sport federation	60	45.2	50.2	
	24	The athlete has both duties and rights during the anti-doping control	60	90.3	29.8	
	28	The attempted use, the possession or trafficking of products included in the prohibited list of the World Anti-Doping Agency are a severe violation of anti-doping rules and call for a sanction to the athlete or to the technician involved	62	93.5	24.8	
	37	According to the WADA code, it is each athlete's personal duty to ensure that no prohibited substance enters his or her body	60	88.7	31.9	
	42	According to the WADA code, the doctor of my team is the only person responsible for ensuring that no prohibited substance enters my body	61	71.0	45.8	
	46	If an athlete has a documented medical condition requiring the use of a prohibited substance or a prohibited method, that athlete may request a therapeutic use exemption	59	75.8	43.2	
	50	In my federation anti-doping controls performed include "in competition", "out of competition", and target tests	58	90.3	29.8	
	52	I know the anti-doping rules of my international federation	60	82.3	38.5	

Table 3

The *ADOPT* section – measuring anti-doping attitudes – was statistically determined by factor analysis as previously described. Even if eleven factors with eigenvalues higher than 1.1 were found, a four-factor model was considered the most appropriate solution after analysis of the Scree Plot. Items with factor loading exceeding the cut-off value of 0.32 were retained in the model (25). Items loaded in more factors were included in the factor for which they had the strongest loading (Figure 6), while items not loaded in any factor were excluded in the final version. Three items included in the preliminary version (Q36, Q45, Q48) were excluded after re-consideration and/or statistical evaluation. Thirty-six items were included in the final version, 25 of them reflecting a positive attitude from respondents towards the anti-doping interventions and 11 a negative attitude.

At the end of the procedure, the final version of the *ADOPT* section investigating anti-doping attitudes – the main topic of interest of the present research – was a 36-item questionnaire with four 9-item factors or domains labelled as *Safety*, *Confidence*, *Acceptance* and *Satisfaction*, as explained in figure 6.

The table 4 displays the results of the factor analysis for items' loading in domains, and the determination of the APPROVE scale structure/*ADOPT Section*.

Sect.	#	Question	Factor loading	Label
ADOPT	9	The international competitions in my sport are clean in terms of doping	.82	SAFETY
	23	Nobody cheats in my sport	.81	
	38	The number of in-competition anti-doping controls performed by my international federation is sufficient	.69	
	41	My international federation adequately informs athletes on anti-doping matters	.61	
	33	The number of out-of-competition anti-doping controls performed by my international federation is sufficient	.55	
	43	The result of the competitions in my sport reflects the quality of athletes and of their technical materials	.41	
	19	The anti-doping tests performed by my international federation are current and up-to-date for all doping agents	.41	
	39	The anti-doping program of my international federation maintains a safe environment in terms of fairness of competitions	.41	
	25	It is impossible to fight doping in sport because new substances and methods that improve performance and that cannot be detected are continually available	.32	
	35	I fear that the urinary sample collected during the anti-doping control can have doping agents added by someone else	.72	CONFIDENCE
	29	I do not trust anti-doping controls managed and performed by my international federation because positive cases are rarely detected in my sport	.65	
	40	I do not believe in anti-doping controls because they can be easily manipulated	.63	
	27	The international federation I belong to is interested in the world anti-doping policy	.62	
	13	I feel that the athletes at high risk of unfair behavior are rarely controlled by my international federation	.61	
	17	Athletes who are not guilty can be wrongly disqualified	.51	
	47	I fear that my biological sample will not be anonymous when analyzed at the laboratory	.47	
	21	My federation is a provider of high-quality products in the field of anti-doping	.37	
	7	I fear that my personal information that I give during the anti-doping control will not be kept confidential	.32	
	44	Anti-doping controls should be carried out at any time of the day	.68	ACCEPTANCE
	14	The athlete's duty is only to compete and not to undergo medical anti-doping controls	.62	
	18	The anti-doping controls are necessary for ensuring fairness of competitions	.60	
	26	The anti-doping controls interfere in athletes' training in an adverse way	.45	
	30	It is right (reasonable) to undergo blood testing before competitions	.44	
	3	It is reasonable (for health, possible manipulations etc.) to restrict athletes from starting if their blood values exceed the competition limits	.41	
	34	I believe that is right to restrict the daily activities of those athletes included in the registered testing pool by way of the athlete whereabouts requirement	.41	
	22	Blood tests should be not performed on athletes of youth categories	.40	
	2	In the case of a non-negative sample, I believe that the result management process (anti-doping administrator, hearing panel, CAS...) (of my international federation) safeguards the athlete	.37	
	51	My international federation invests enough money in the anti-doping field	.73	SATISFACTION
	31	There has been an improvement in the anti-doping controls performed by my international federation	.55	
	15	The mixture of anti-doping tests and educational programs of my international federation is effective	.53	
	11	The athlete biological passport, noting variances in the profile of an athlete's biological markers over a period of time, increases the possibility to detect doping violations in my sport	.53	
	8	The fact that the national and international anti-doping organizations work in coordination with each other is beneficial to the athletes because it improves the anti-doping system	.51	
	53	The anti-doping personnel in my international sport federation are professional	.50	
	49	Anti-doping controls are effective in our sport to improve the environment in terms of fairness of competition results	.49	
	4	The present anti-doping rules of my international federation safeguard health and fairness	.46	
	10	I feel that the medical committee of my federation is effective in maintaining a safe environment without doping	.33	

Table 4



The *Safety* and *Confidence* domains reflect the respondents' attitudes towards the safety perceived in terms of fairness of the competitions, and athletes' confidence in the work environment (activities and procedures) respectively. The related items deal with the number of tests performed, the operators' expertise, the capacity of the laboratories to detect new substances, and the safety level of the different phases of the anti-doping control process.

The *Acceptance* subscale investigates respondents' acceptance of anti-doping rules and procedures, including possible limitations on their quality of life and training time.

The *Satisfaction* subscale reflects respondents' satisfaction with rules and services – in terms of anti-doping interventions – offered by the international federation, and with the federation management.

The list of items selected and included in the final English version of the APPROVE scale is shown in appendix.

### 6.1.3. Items and domain scores in the population sample

In the *ADOPT* section (Table 13) the score was  $64.4 \pm 9$  for the sample group, with two subjects reporting an insufficient attitude ( $\leq 50$ ) and four an excellent attitude ( $> 80$ ). The following scores values were calculated for each of the four related domains.

- *Safety*:  $55.1 \pm 15.6$ ;
- *Confidence*:  $61.6 \pm 16.1$ ;
- *Acceptance*:  $70.1 \pm 12.0$ ;
- *Satisfaction*:  $70.9 \pm 10.8$ ;

The results of the questionnaire definition and validation are shown in Table 5 below.

Domain	#	Question	n	Mean	SD	Domain mean
SAFETY	9	The international competitions in my sport are clean in terms of doping	62	42.7	30.2	55.1
	19	The anti-doping tests performed by my international federation are current and up-to-date for all doping agents	61	65.3	22.3	
	23	Nobody cheats in my sport	61	29.0	30.8	
	25	It is impossible to fight doping in sport because new substances and methods that improve performance and that cannot be detected are continually available	62	51.6	27.5	
	33	The number of out-of-competition anti-doping controls performed by my international federation is sufficient	61	46.4	22.1	
	38	The number of in-competition anti-doping controls performed by my international federation is sufficient	60	57.7	24.2	
	39	The anti-doping program of my international federation maintains a safe environment in terms of fairness of competitions	62	70.6	19.5	
	41	My international federation adequately informs athletes on anti-doping matters	62	64.1	24.6	
	43	The result of the competitions in my sport reflects the quality of athletes and of their technical materials	60	68.1	21.8	

CONFIDENCE	7	I fear that my personal information that I give during the anti-doping control will not be kept confidential	60	58.9	26.8	<b>61.6</b>
	13	I feel that the athletes at high risk of unfair behavior are rarely controlled by my international federation	61	48.0	24.1	
	17	Athletes who are not guilty can be wrongly disqualified	58	52.0	30.5	
	21	My federation is a provider of high-quality products in the field of anti-doping	62	64.9	23.3	
	27	The international federation I belong to is interested in the world anti-doping policy	62	75.4	17.8	
	29	I do not trust anti-doping controls managed and performed by my international federation because positive cases are rarely detected in my sport	62	62.9	24.7	
	35	I fear that the urinary sample collected during the anti-doping control can have doping agents added by someone else	62	65.3	25.7	
	40	I do not believe in anti-doping controls because they can be easily manipulated	62	70.2	23.9	
	47	I fear that my biological sample will not be anonymous when analyzed at the laboratory	60	57.3	24.1	
ACCEPTANCE	2	In the case of a non-negative sample, I believe that the result management process (anti-doping administrator, hearing panel, CAS...) (of my international federation) safeguards the athlete	61	64.9	21.9	<b>70.1</b>
	3	It is reasonable (for health, possible manipulations etc.) to restrict athletes from starting if their blood values exceed the competition limits	62	86.3	19.0	
	14	The athlete's duty is only to compete and not to undergo medical anti-doping controls	62	64.9	33.7	
	18	The anti-doping controls are necessary for ensuring fairness of competitions	62	92.3	12.5	
	22	Blood tests should be not performed on athletes of youth categories	61	58.5	30.0	
	26	The anti-doping controls interfere in athletes' training in an adverse way	62	63.3	26.7	
	30	It is right (reasonable) to undergo blood testing before competitions	62	71.8	28.8	
	34	I believe that is right to restrict the daily activities of those athletes included in the registered testing pool by way of the athlete whereabouts requirement	59	62.5	23.0	
44	Anti-doping controls should be carried out at any time of the day	60	66.5	29.7		
SATISFACTION	4	The present anti-doping rules of my international federation safeguard health and fairness	62	76.8	18.0	<b>70.9</b>
	8	The fact that the national and international anti-doping organizations work in coordination with each other is beneficial to the athletes because it improves the anti-doping system	60	73.0	20.4	
	10	I feel that the medical committee of my federation is effective in maintaining a safe environment without doping	61	70.2	23.0	
	11	The athlete biological passport, noting variances in the profile of an athlete's biological markers over a period of time, increases the possibility to detect doping violations in my sport	61	76.2	17.8	
	15	The mixture of anti-doping tests and educational programs of my international federation is effective	60	65.3	16.5	
	31	There has been an improvement in the anti-doping controls performed by my international federation	62	73.4	15.6	
	49	Anti-doping controls are effective in our sport to improve the environment in terms of fairness of competition results	62	73.0	19.9	
	51	My international federation invests enough money in the anti-doping field	61	58.1	18.5	
	53	The anti-doping personnel in my international sport federation are professional	61	70.2	19.6	
<b>ADOPT (36 Items)</b>					9.4	<b>64.4</b>

Table 5

In the population sample, a significantly lower score was found for the *Safety* domain compared to the other domains ( $P < 0.0001$ ). *Acceptance* and *Satisfaction* showed higher scores compared to *Safety* and *Confidence* domains (Fig. 7).

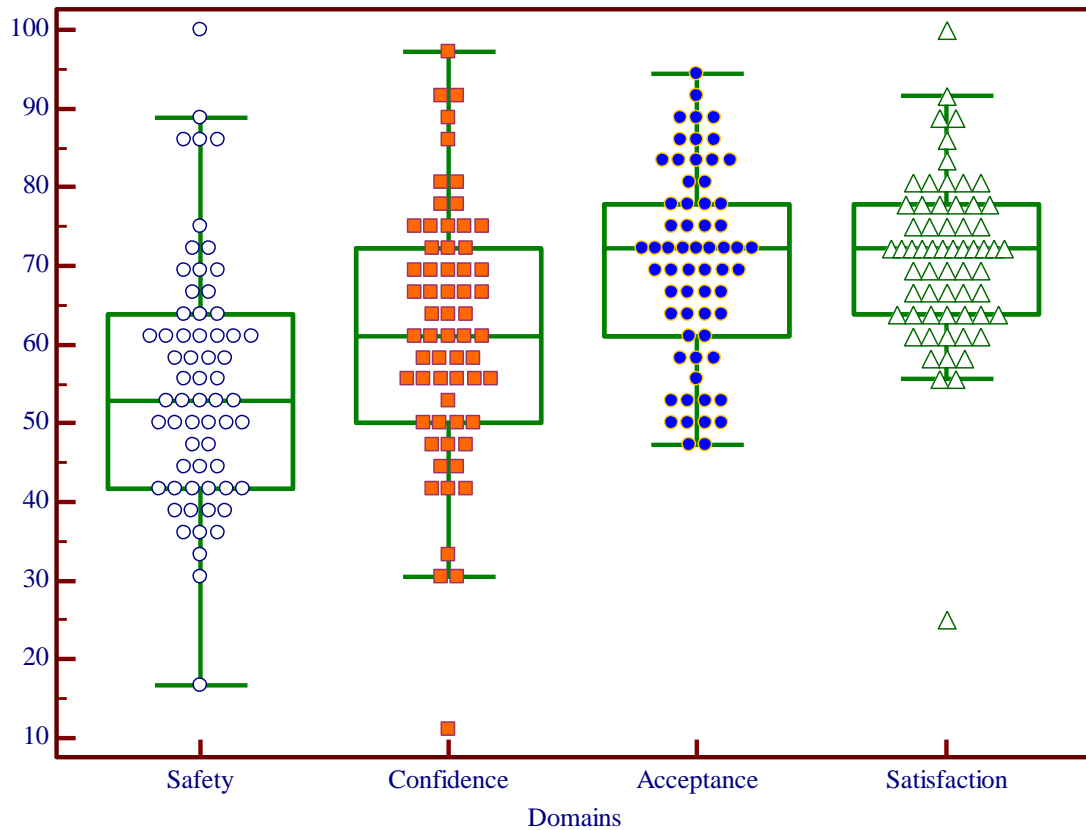


Figure 7

#### 6.1.4 Validation

Construct validity: due to 7 data being missing from among 55 respondents, the degree of correlation of the single item *Overall satisfaction* ( $3.6 \pm 0.8$ ) with the *ADOPT* score ( $64.4 \pm 9.4$ ) was moderate, and for the different domains was moderate with *Safety*, *Confidence* and *Satisfaction*, while it was low, as expected, with *Acceptance*.

The correlation values between the *ADOPT* score and the related domain versus a single-item of general satisfaction are shown in Table 6 below.

Domain	n	Mean	SD	<i>Correlation with Overall Satisfaction</i>	
<b>Overall satisfaction</b>	55	3.6	0.8		
				<i>r</i>	<i>p</i>
<i>ADOPT</i>	62	64.4	9.4	.484	.000
<i>Safety</i>	62	55.1	15.6	.488	.000
<i>Confidence</i>	62	61.6	16.1	.401	.001
<i>Acceptance</i>	62	70.1	12.3	-.140	n.s.
<i>Satisfaction</i>	62	70.9	10.8	.573	.000

Table 6

Reliability: of the 12 questionnaires distributed to the same subjects at 2 different venues, 8 were returned, and among these, 2 were unmatchable due to the respondent having written an incorrect code. The analysis of the 6 questionnaires with a correct code showed a moderate degree of agreement for the *ADOPT* score values in the two trials (Spearman's Rho = 0.627,  $p < 0.000$ ; Cohen's Kappa = 0.50)

The test-retest reliability evaluation on individual items showed low-moderate to very high correlation scores for the responses for all the items in the two trials in each domain under study (Spearman's Rho range: *Safety* range 0.35-1; *Confidence*: range 0.42-0.98; *Acceptance* : 0.45-0.91; *Satisfaction*: range 0.42-1)

The internal consistency of the questionnaire for the complete 36-item scale was good ( $\alpha = 0.85$ ), with high values for the safety, confidence and satisfaction domains ( $\alpha = 0.80, 0.84$  and  $0.74$  respectively) and with a lower value, as expected, for *Acceptance* ( $\alpha = 0.61$ ), where mixed traits are measured. The values are reported in table 7.

Domains	Items	Cronbach's $\alpha$
<i>ADOPT</i>	36	0.85
<i>Safety</i>	9	0.80
<i>Confidence</i>	9	0.84
<i>Acceptance</i>	9	0.61
<i>Satisfaction</i>	9	0.74

Table 7

Bias response: the average score for the Lye questions was 73.1 – not significantly different from the score in the other domains, and not indicating any socially desirable responding bias.

## 6.2 Phase 3 / Objective 2 –Results. Evaluation of anti-doping attitudes among elite biathletes

Two-hundred forty four biathletes participated in the survey, with a response rate of 44.4%. The sample size collected (n = 244) in relation to the distributed questionnaires (n = 550) exceeded the critical number required to make the study valid. The sample collected can be also considered representative of the whole population of elite biathletes participating in IBU competitions.

There were 244 respondents (males n = 138, 57%). The *Demographics* of the population of elite biathletes participating in the survey details are shown in Table 8 below.

<u>Variable</u>	<u>Group</u>	<u>n</u>	<u>%</u>
<b>Gender</b>	Male	138	57
	Female	106	43
	<b>Total</b>	<b>244</b>	<b>100</b>
<b>Age</b>	≤20	21	9
	20-28	174	71
	≥28	49	20
	<b>Total</b>	<b>244</b>	<b>100</b>
<b>Participation in IBU competitions (years)</b>	<5	130	54
	≥5	112	46
	<b>Total</b>	<b>242</b>	<b>100</b>
<b>Participation in IBU World Cup competitions (years)</b>	<3	136	61
	≥3	88	39
	<b>Total</b>	<b>224</b>	<b>100</b>
<b>Participation in national biathlon competitions (years)</b>	<5	50	21
	≥5	192	79
	<b>Total</b>	<b>242</b>	<b>100</b>
<b>Participation in competitions held by other international federations (years)</b>	Yes	49	21
	No	187	79
	<b>Total</b>	<b>236</b>	<b>100</b>

Table 8

The languages of the questionnaires collected were: English 132, 54%; Russian 65, 27%; German 30, 12%; Italian 19, 7% (table 9).

<u>Variable</u>	<u>Group</u>	<u>n</u>	<u>%</u>
<b>Questionnaire's language</b>	English	132	54
	Russian	65	27
	German	30	12
	Italian	17	7
	<b>Total</b>	<b>244</b>	<b>100</b>

Table 9

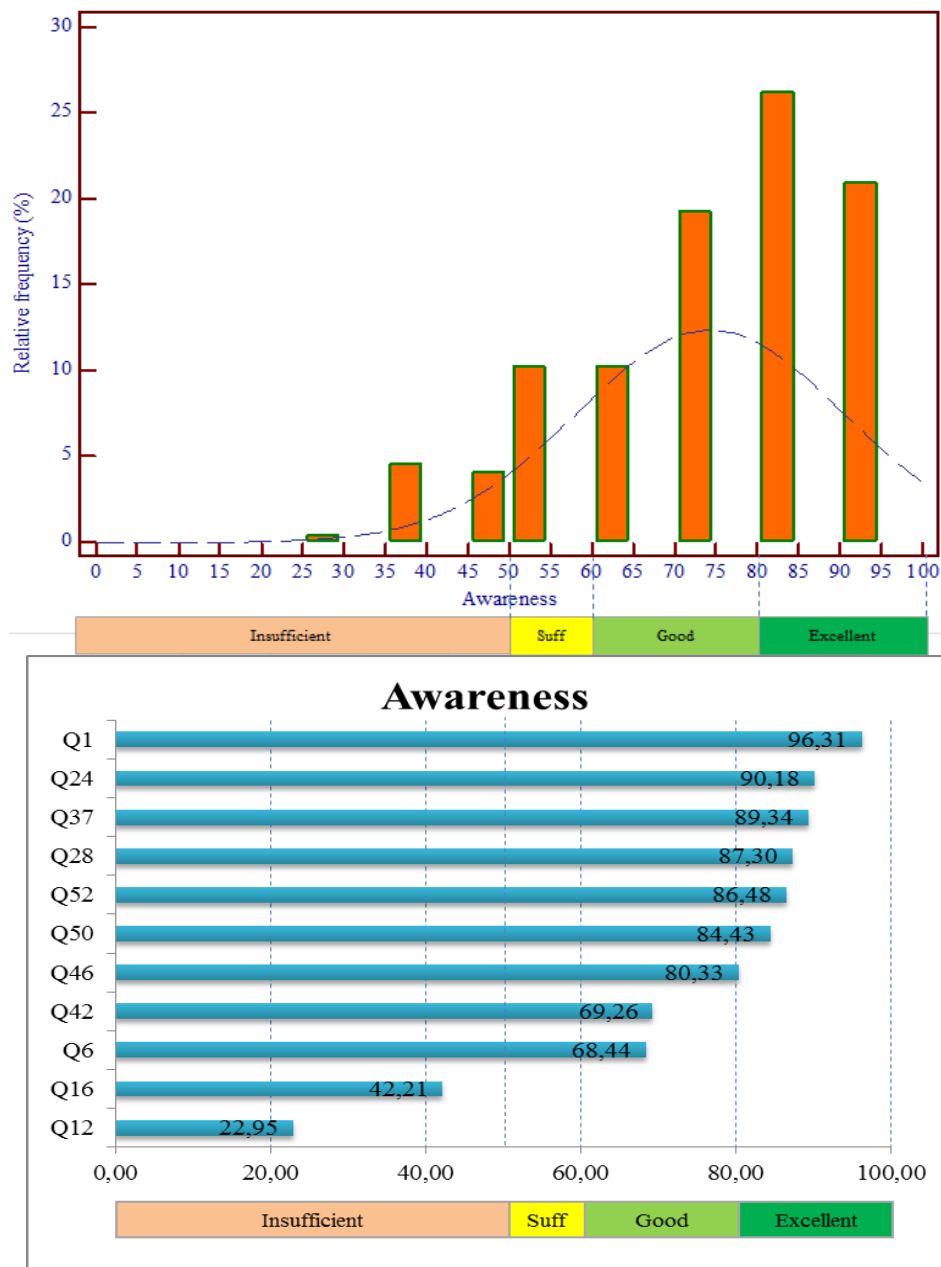
All questionnaires were suitable for analysis considering the low number of missing values (167 out of 11468 answers or 0.015%). The items with a high rate of missing values were Q2 (n = 11; rate of 4.5%) in the domain of *Acceptance*, and Q 17 (n = 8; rate of 3.3%) from the *Confidence* domain. Critical questions in the domain of *Awareness* were Q16, Q1, and Q50, with 12, 8 and 8 missing values, respectively.

For the Section *Awareness*, the average score was 74.3, with an insufficient score for 9% of the population sample (mainly in younger athletes) and a good to excellent score for 81% of athletes (51% excellent). The results collected among elite biathletes are reported in Table 10 below.

Factor	#	Question	n	Mean	SD	Factor mean
AWARENESS	1	The prohibited list of the World Anti-Doping Agency is updated every year	236	96.3	18.9	74.3
	6	I have never read the anti-doping rules of my international federation because they are difficult and should be explained to me by an expert	240	68.4	46.6	
	12	An athlete can be sanctioned for doping only if his/her biological sample is positive at the anti-doping control	241	23.0	42.1	
	16	The prohibited list of the World Anti-Doping Agency and the sanctions for positive athletes are different for each international Olympic sport federation	232	42.2	49.5	
	24	The athlete has both duties and rights during the anti-doping control	239	90.2	29.8	
	28	The attempted use, the possession or trafficking of products included in the prohibited list of the World Anti-Doping Agency are a severe violation of anti-doping rules and call for a sanction to the athlete or to the technician involved	239	87.3	33.4	
	37	According to the WADA code, it is each athlete's personal duty to ensure that no prohibited substance enters his or her body	240	89.3	30.9	
	42	According to the WADA code, the doctor of my team is the only person responsible for ensuring that no prohibited substance enters my body	240	69.3	46.2	
	46	If an athlete has a documented medical condition requiring the use of a prohibited substance or a prohibited method, that athlete may request a therapeutic use exemption	238	80.3	39.8	
	50	In my federation anti-doping controls performed include "in competition", "out of competition", and target tests	236	84.4	36.3	
	52	I know the anti-doping rules of my international federation	243	86.5	34.3	

Table 10

The frequency of distribution, and the results of the score values for *Awareness* (visualized in descending item score order) are shown in Figure 8 below.



#	Question
1	The prohibited list of the World Anti-Doping Agency is updated every year
6	I have never read the anti-doping rules of my international federation because they are difficult and should be explained to me by an expert
12	An athlete can be sanctioned for doping only if his/her biological sample is positive at the anti-doping control
16	The prohibited list of the World Anti-Doping Agency and the sanctions for positive athletes are different for each international Olympic sport federation
24	The athlete has both duties and rights during the anti-doping control
28	The attempted use, the possession or trafficking of products included in the prohibited list of the World Anti-Doping Agency are a severe violation of anti-doping rules and call for a sanction to the athlete or to the technician involved
37	According to the WADA code, it is each athlete's personal duty to ensure that no prohibited substance enters his or her body
42	According to the WADA code, the doctor of my team is the only person responsible for ensuring that no prohibited substance enters my body
46	If an athlete has a documented medical condition requiring the use of a prohibited substance or a prohibited method, that athlete may request a therapeutic use exemption
50	In my federation anti-doping controls performed include "in competition", "out of competition", and target tests
52	I know the anti-doping rules of my international federation

Figure 8

*Anti-doping attitude and domain scores:* the *ADOPT* score obtained was 64.9, with an insufficient general attitude score ( $\leq 50$ ) obtained by 14 subjects (6%) and with a positive attitude with good to excellent score levels prevalent among 69% and 5% of the respondents respectively (Table 11). The results were not significantly different in relation to age, gender or language of the interviewed athletes.

The *Safety* domain showed a score of 58.2 with a rate of insufficient scores for 31% of the population sample and with good to excellent score levels for 31 and 10% of the respondents respectively (Table 11). The scores were similar for age and gender and significantly higher ( $p < 0.0001$ ) for questionnaires answered in Russian and English versus those answered in German and Italian.

The domain *Confidence* showed a score of 62.6 with a rate of insufficient scores for 20% of the population sample and with scores corresponding to a good or excellent level for 57% and 7% of the respondents respectively (Table 11). The scores were similar for age, gender and language.

The domain *Acceptance* showed a score of 67.9, with an insufficient level for 7% of the population sample, and with scores from good to excellent for 62 and 15% of the respondents respectively (Table 11). The scores, similar for age and gender, were significantly lower ( $p < 0.0001$ ) for questionnaires answered in Russian versus those answered in other languages.

The *Satisfaction* domain showed a score of 70.8 with an insufficient score for 5% of the respondents, with scores corresponding to good and excellent level for 64 and 22% of the respondents respectively (Table 11). The scores were similar for age, gender and language.

Figs 9, 10, 11, 12, 13 show the frequency of distribution of *ADOPT* and of the four domains (*Safety*, *Confidence*, *Acceptance*, *Satisfaction*) and the scores among elite biathletes visualized with items in descending order. The list of items for the domain is also stated.



Domain	#	Question	n	Mean	SD	Domain mean
SAFETY	9	The international competitions in my sport are clean in terms of doping	242	51.9	31.5	58.2
	19	The anti-doping tests performed by my international federation are current and up-to-date for all doping agents	238	68.0	21.2	
	23	Nobody cheats in my sport	242	37.4	30.0	
	25	It is impossible to fight doping in sport because new substances and methods that improve performance and that cannot be detected are continually available	242	49.8	28.9	
	33	The number of out-of-competition anti-doping controls performed by my international federation is sufficient	243	55.2	26.1	
	38	The number of in-competition anti-doping controls performed by my international federation is sufficient	244	62.4	24.9	
	39	The anti-doping program of my international federation maintains a safe environment in terms of fairness of competitions	243	70.1	20.2	
	41	My international federation adequately informs athletes on anti-doping matters	240	65.4	23.4	
	43	The result of the competitions in my sport reflects the quality of athletes and of their technical materials	237	66.3	23.8	
CONFIDENCE	7	I fear that my personal information that I give during the anti-doping control will not be kept confidential	243	61.4	26.1	62.6
	13	I feel that the athletes at high risk of unfair behavior are rarely controlled by my international federation	242	50.5	26.2	
	17	Athletes who are not guilty can be wrongly disqualified	236	55.8	26.4	
	21	My federation is a provider of high-quality products in the field of anti-doping	239	65.8	21.2	
	27	The international federation I belong to is interested in the world anti-doping policy	241	74.3	18.9	
	29	I do not trust anti-doping controls managed and performed by my international federation because positive cases are rarely detected in my sport	242	63.3	22.6	
	35	I fear that the urinary sample collected during the anti-doping control can have doping agents added by someone else	243	61.8	27.3	
	40	I do not believe in anti-doping controls because they can be easily manipulated	243	65.6	22.3	
	47	I fear that my biological sample will not be anonymous when analyzed at the laboratory	240	64.4	21.0	
ACCEPTANCE	2	In the case of a non-negative sample, I believe that the result management process (anti-doping administrator, hearing panel, CAS...) (of my international federation) safeguards the athlete	233	66.0	20.7	67.9
	3	It is reasonable (for health, possible manipulations etc.) to restrict athletes from starting if their blood values exceed the competition limits	242	78.5	20.7	
	14	The athlete's duty is only to compete and not to undergo medical anti-doping controls	241	64.2	30.8	
	18	The anti-doping controls are necessary for ensuring fairness of competitions	243	89.7	15.8	
	22	Blood tests should be not performed on athletes of youth categories	240	62.0	27.9	
	26	The anti-doping controls interfere in athletes' training in an adverse way	244	64.2	23.9	
	30	It is right (reasonable) to undergo blood testing before competitions	243	70.4	25.3	
	34	I believe that is right to restrict the daily activities of those athletes included in the registered testing pool by way of the athlete whereabouts requirement	242	58.5	26.4	
	44	Anti-doping controls should be carried out at any time of the day	241	57.3	30.8	
SATISFACTION	4	The present anti-doping rules of my international federation safeguard health and fairness	243	78.7	19.2	70.8
	8	The fact that the national and international anti-doping organizations work in coordination with each other is beneficial to the athletes because it improves the anti-doping system	242	77.0	18.3	
	10	I feel that the medical committee of my federation is effective in maintaining a safe environment without doping	241	74.1	22.3	
	11	The athlete biological passport, noting variances in the profile of an athlete's biological markers over a period of time, increases the possibility to detect doping violations in my sport	239	70.3	19.6	
	15	The mixture of anti-doping tests and educational programs of my international federation is effective	241	67.3	19.4	
	31	There has been an improvement in the anti-doping controls performed by my international federation	240	66.1	19.8	
	49	Anti-doping controls are effective in our sport to improve the environment in terms of fairness of competition results	240	71.4	20.0	
	51	My international federation invests enough money in the anti-doping field	240	59.2	21.4	
	53	The anti-doping personnel in my international sport federation are professional	242	73.1	19.7	

Table 11

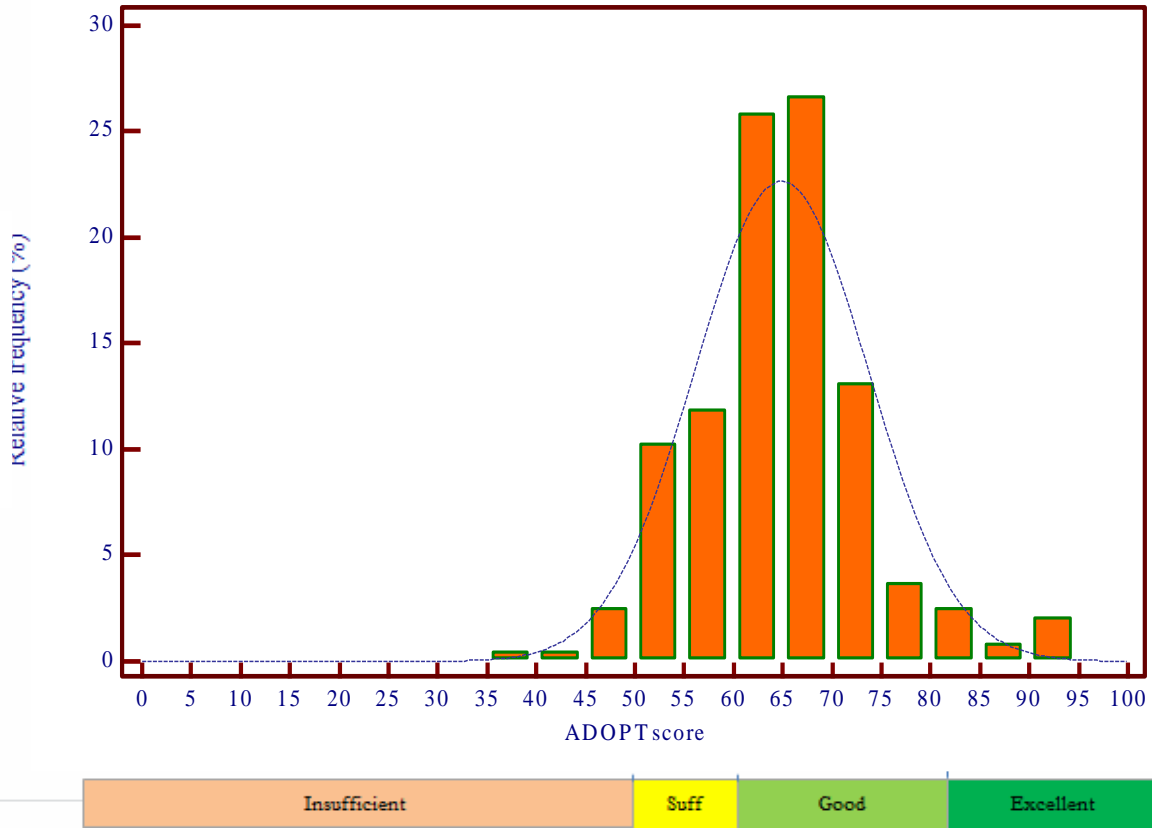
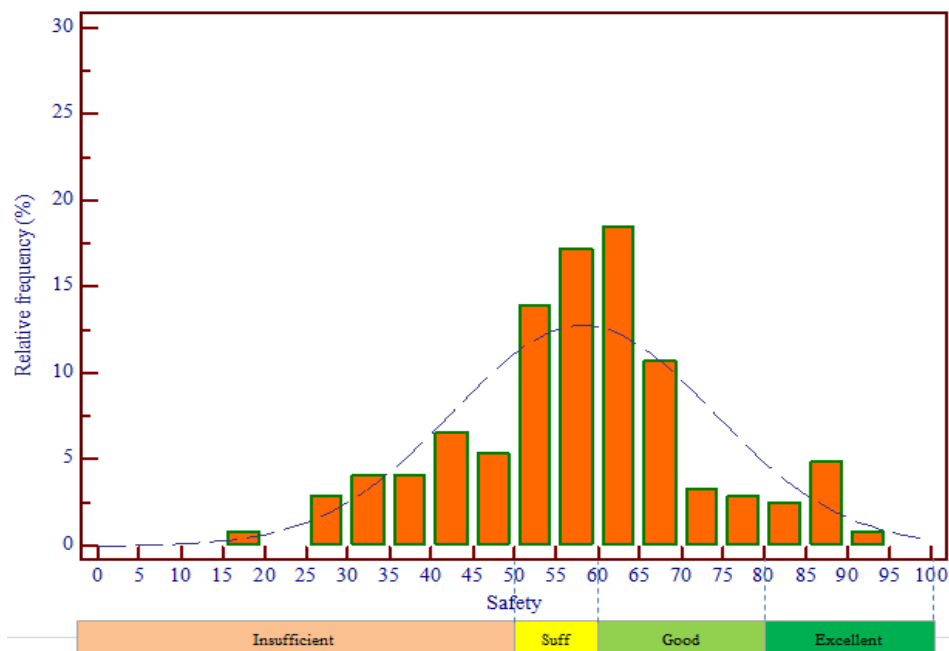
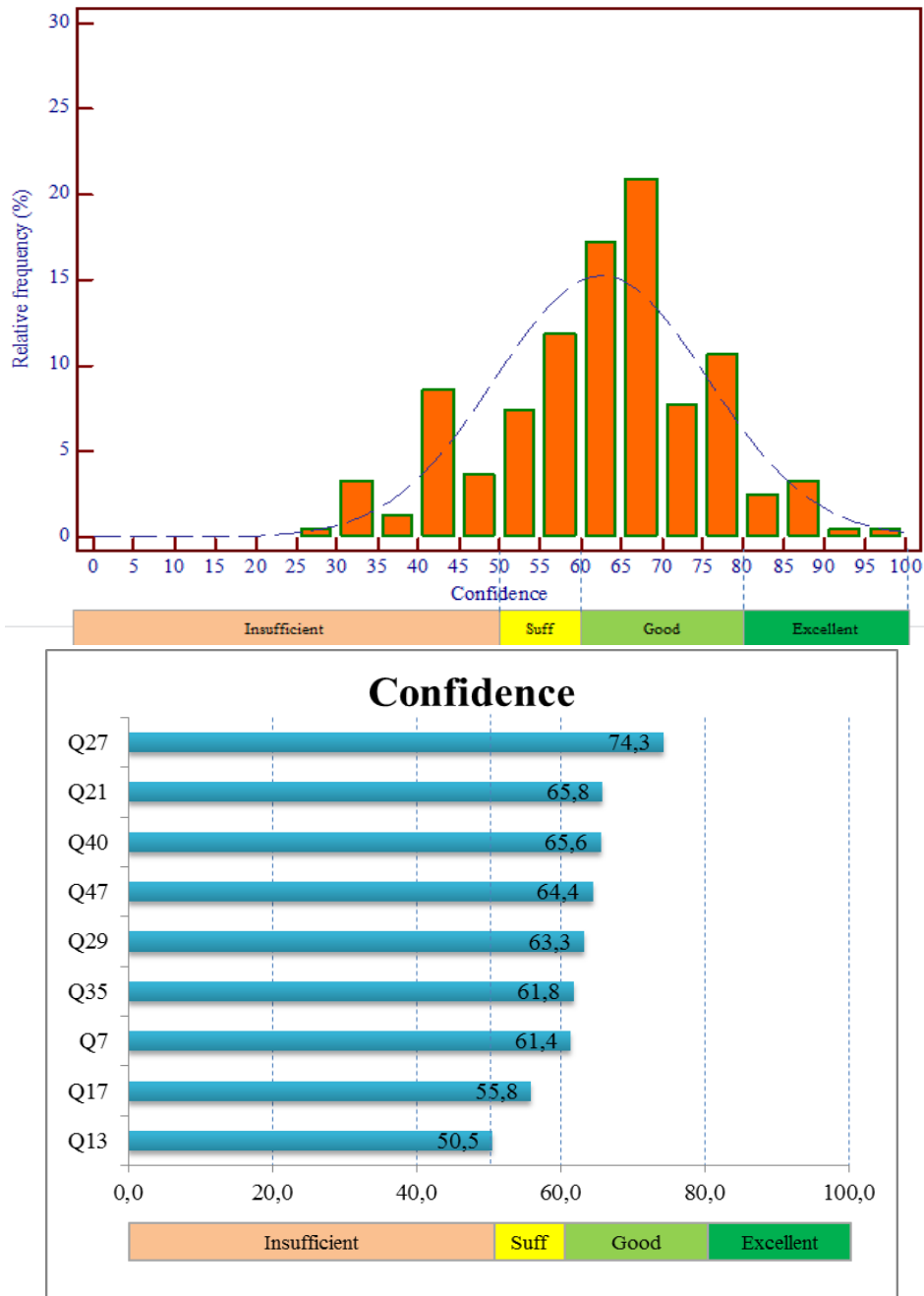


Figure 9



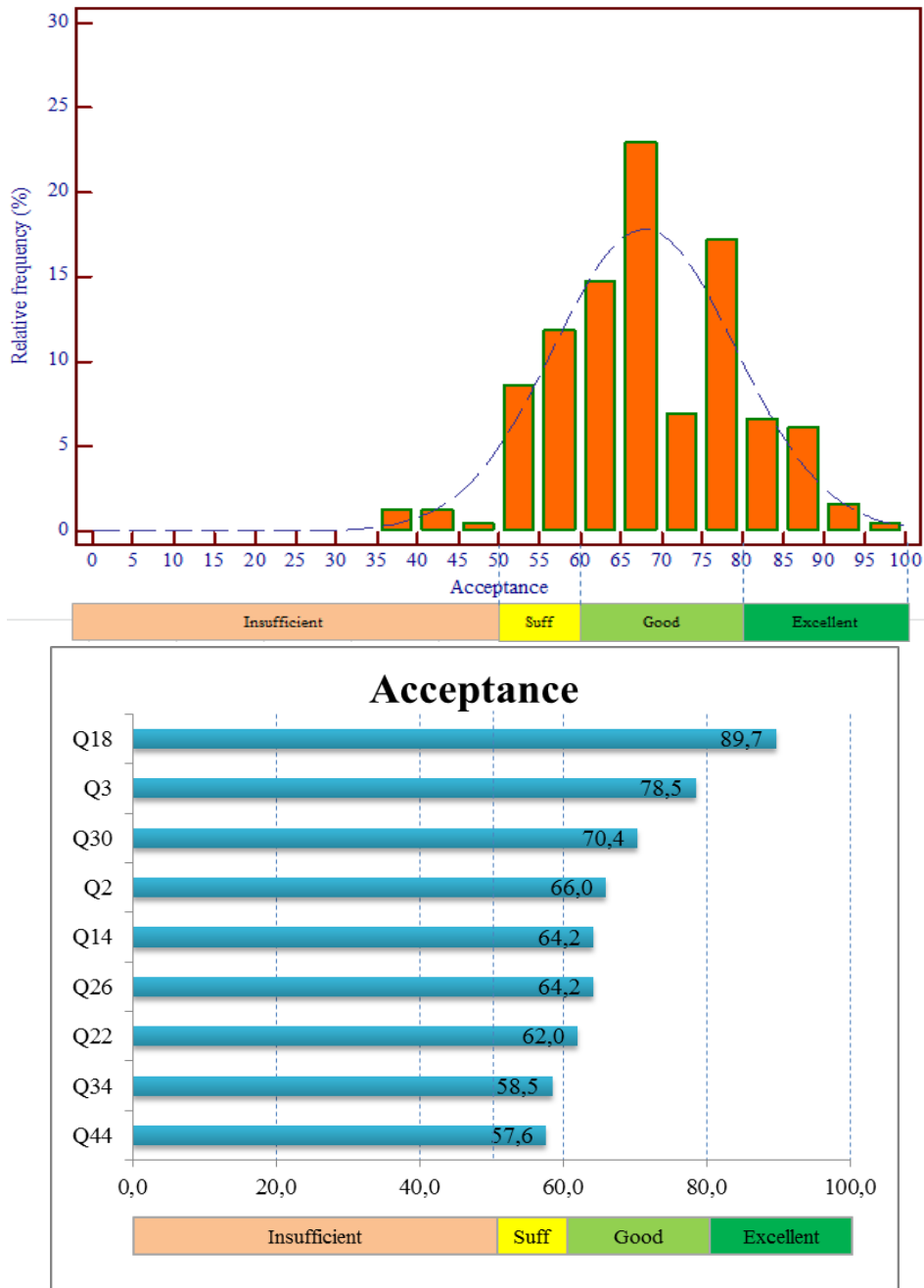
#	Question
9	The international competitions in my sport are clean in terms of doping
19	The anti-doping tests performed by my international federation are current and up-to-date for all doping agents
23	Nobody cheats in my sport
25	It is impossible to fight doping in sport because new substances and methods that improve performance and that cannot be detected are continually available
33	The number of out-of-competition anti-doping controls performed by my international federation is sufficient
38	The number of in-competition anti-doping controls performed by my international federation is sufficient
39	The anti-doping program of my international federation maintains a safe environment in terms of fairness of competitions
41	My international federation adequately informs athletes on anti-doping matters
43	The result of the competitions in my sport reflects the quality of athletes and of their technical materials

Figure 10



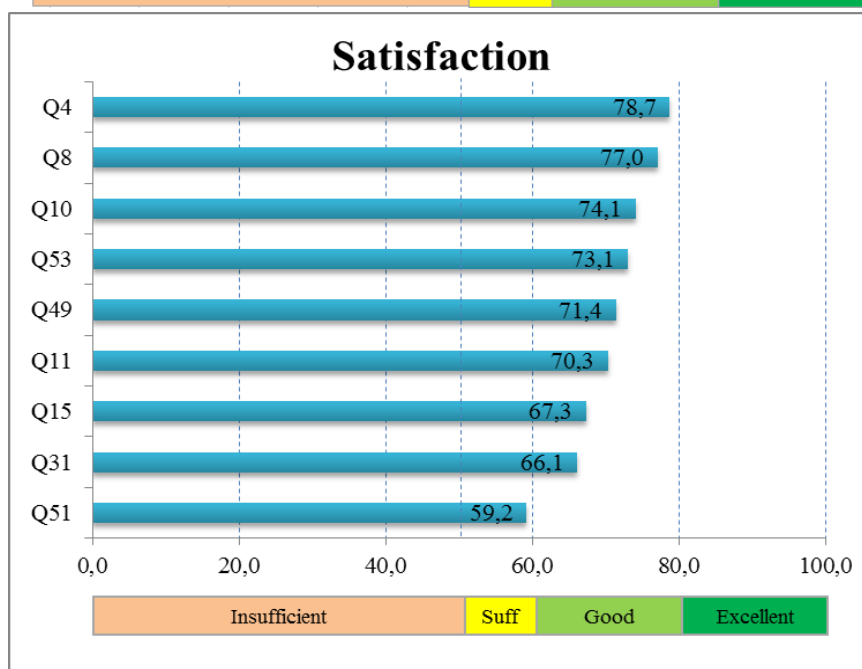
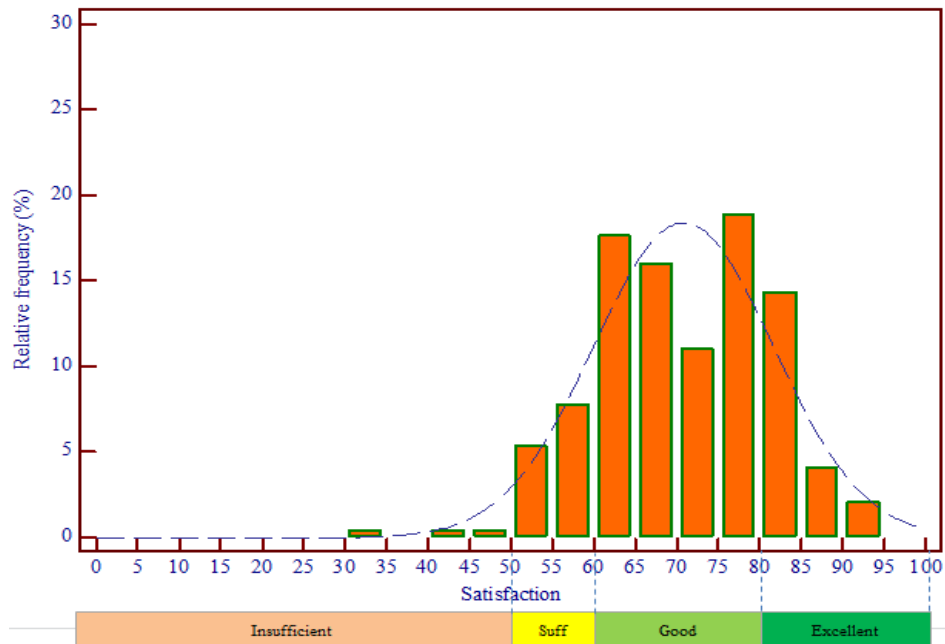
#	Question
7	I fear that my personal information that I give during the anti-doping control will not be kept confidential
13	I feel that the athletes at high risk of unfair behavior are rarely controlled by my international federation
17	Athletes who are not guilty can be wrongly disqualified
21	My federation is a provider of high-quality products in the field of anti-doping
27	The international federation I belong to is interested in the world anti-doping policy
29	I do not trust anti-doping controls managed and performed by my international federation because positive cases are rarely detected in my sport
35	I fear that the urinary sample collected during the anti-doping control can have doping agents added by someone else
40	I do not believe in anti-doping controls because they can be easily manipulated
47	I fear that my biological sample will not be anonymous when analyzed at the laboratory

Figure 11



#	Question
2	In the case of a non-negative sample, I believe that the result management process (anti-doping administrator, hearing panel, CAS...) (of my international federation) safeguards the athlete
3	It is reasonable (for health, possible manipulations etc.) to restrict athletes from starting if their blood values exceed the competition limits
14	The athlete's duty is only to compete and not to undergo medical anti-doping controls
18	The anti-doping controls are necessary for ensuring fairness of competitions
22	Blood tests should be not performed on athletes of youth categories
26	The anti-doping controls interfere in athletes' training in an adverse way
30	It is right (reasonable) to undergo blood testing before competitions
34	I believe that is right to restrict the daily activities of those athletes included in the registered testing pool by way of the athlete whereabouts requirement
44	Anti-doping controls should be carried out at any time of the day

Figure 12



#	Question
4	The present anti-doping rules of my international federation safeguard health and fairness
8	The fact that the national and international anti-doping organizations work in coordination with each other is beneficial to the athletes because it improves the anti-doping system
10	I feel that the medical committee of my federation is effective in maintaining a safe environment without doping
11	The athlete biological passport, noting variances in the profile of an athlete's biological markers over a period of time, increases the possibility to detect doping violations in my sport
15	The mixture of anti-doping tests and educational programs of my international federation is effective
31	There has been an improvement in the anti-doping controls performed by my international federation
49	Anti-doping controls are effective in our sport to improve the environment in terms of fairness of competition results
51	My international federation invests enough money in the anti-doping field
53	The anti-doping personnel in my international sport federation are professional

Figure 13

Among the domains relating to anti-doping attitudes, a significantly lower value was observed for *Safety* compared to the other 3 domains ( $p < 0.0001$ ) and for *Confidence* compared to *Acceptance* and *Satisfaction*, the domain with the best score (Fig. 14).

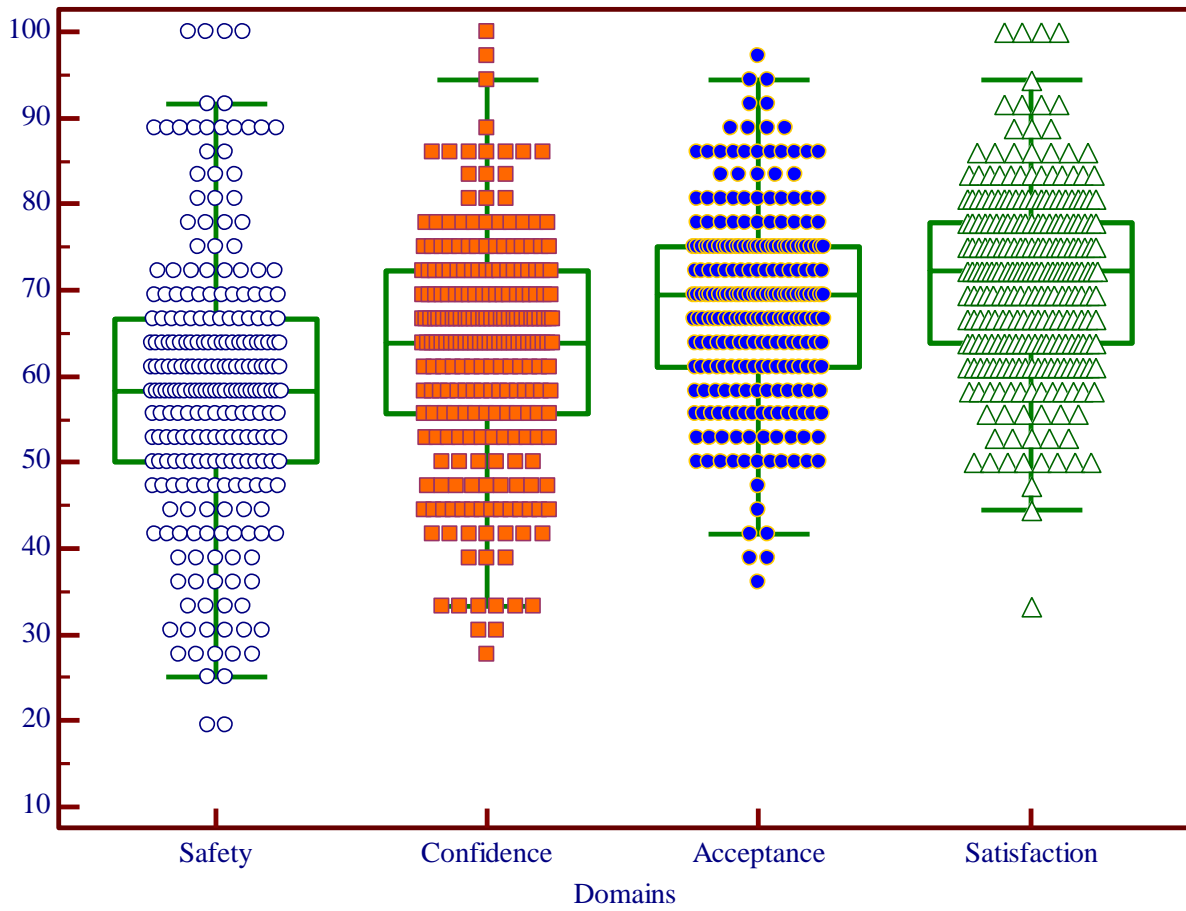


Figure 14

The questions involved in the calculation of the federation score are shown in Figure 15.

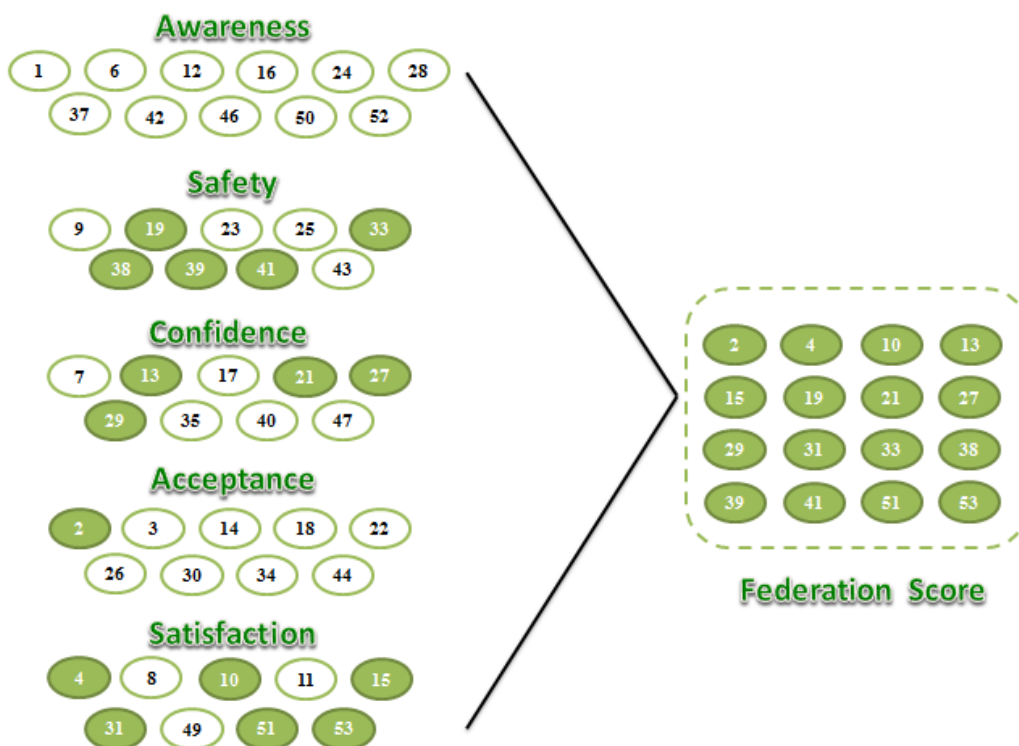


Figure 15

The Federation score obtained was 66.2, with an insufficient score ( $\leq 50$ ) obtained by 27 subjects (11%) and with a positive feeling about federation activity with good to excellent score levels prevalent among 65% and 8% of the respondents respectively. The frequency of distribution of the score is shown in Figure 16.

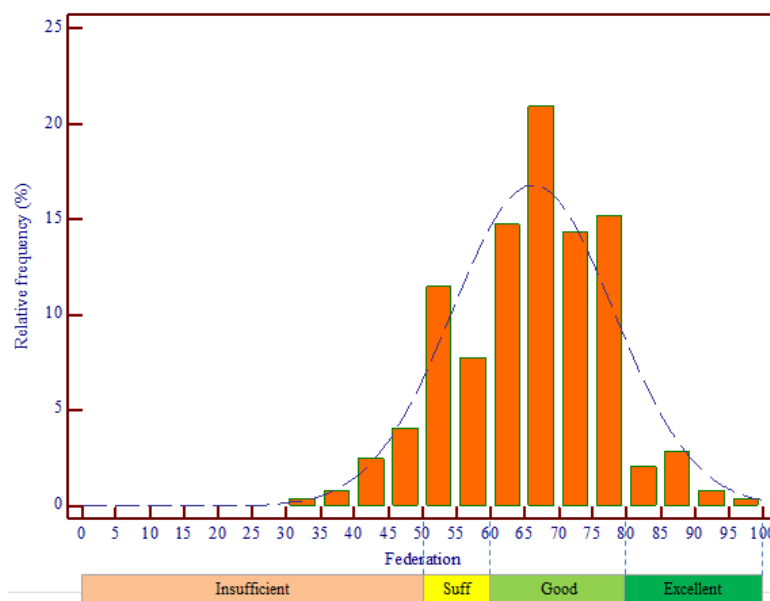


Figure 16



*Analysis of single items:* Considering the distribution of responses for each item, those with absolute lower scores were from the *Safety* domain, dealing with the presence of doping in the athlete's sport and the impossibility of fighting it (Q23 and Q25, with scores equal to 48% and 60%, respectively) and Q13 from *Confidence* reporting an insufficient control of athletes at higher risk (score 60%).

The item with the highest positive score was Q18 in the domain of *Acceptance*, dealing with the necessity of the anti-doping controls to ensure fairness of competitions (score 89.7%). Interestingly, the ADOPT score was directly correlated to the degree of *Awareness* of the athletes interviewed ( $r = 0.431$ ,  $p < 0.0001$ ).

## 7. Discussion

The project allowed us to develop and validate an original questionnaire useful for measuring the anti-doping attitudes among top-level athletes and technicians. This field of inquiry, which might become progressively more important in relation to the increasing pressure on athletes imposed by the anti-doping programs, has previously not been the subject of much research(9). The idea to develop a tool able to quantify athletes' feelings, fears and complaints in relation to the anti-doping issues was challenging; however the use of informal conversation-style interviews with athletes and technicians by a group of researchers each with experience as both former athletes, team doctors and/or international medical delegates at the venues was helpful, and supported by the statistical analysis. The factors identified in the statistical analysis reasonably confirmed the dimensions hypothesized by the researchers, with only one additional domain needing to be included, as well the corresponding items generated. Satisfactory results were obtained in the APPROVE scale validation phase. Face and content validity were not tested, the questions being derived from interviews. The construct validity was good considering that a single item describing generic overall satisfaction with the anti-doping program was correlated with a multidimensional parameter, the *ADOPT* score, exploring different concepts related to anti-doping attitudes and including a domain not correlated to satisfaction: acceptance. Internal consistency was good, and a moderate level of test-retest reliability was found, even given the limited sample size. Different actions were also taken to reduce the main responding biases. The tool therefore appears to be valid, usable on broad populations, suitably quick to compile (around 15 min.) and easy to use considering the previously mentioned low number of missing values and the usability of all the returned questionnaires.

The first implementation of APPROVE was in biathlon, where good anti-doping attitudes were observed and where, among the four domains, the highest score was found for *Satisfaction*. A good level of willingness to accept the limitations imposed by the rules was also observed, considering that the item with the highest positive score (89.7) deals with the necessity of the anti-doping controls in order to ensure fairness of competitions. Interestingly, high acceptance scores were observed for undergoing blood testing before competitions (70.2) and to restricting athletes from starting if their blood values exceed the competition limits (78.5). Lower but sufficient scores were also obtained for items describing athletes' limitations such as the possibility of being tested at any time of the day (58.5) and the limitations in the daily activities of athletes included in the registered testing pool caused by having to provide whereabouts information (57.6). Some of these results were unexpected, considering the pressure on athletes imposed by different tests e.g. out-of-competition tests or blood tests with risk of suspension in case of blood values exceeding the limits, and by rules that also affect athletes' quality of life and training. In particular, the issue of the whereabouts is often controversial (1, 2). In a previous study – a cross-sectional survey among Norwegian elite athletes included in the national registered testing pool – the whereabouts system was

perceived by some athletes as frustrating and unfair (9). In this survey however, the situation was different from our study, because athletes of the same nation – and from different disciplines – were interviewed. They complained that athletes from other countries were less subject to comprehensive controls or did not provide whereabouts information. In our study, the situation is instead homogeneous in terms of ‘pressure’ on athletes by the IF, even if different approaches among the different countries remain.

The unsatisfactory sense of safety against cheating is another important aspect to highlight, considering that for the *Safety* domain a rate of insufficient scores was found for 31% of the population. The two items with the lowest scores on the whole scale were from the *Safety* domain, dealing with the presence of doping in the athlete’s sport (48%) and the impossibility of fighting it (60%). This relatively low perception of safety represents another difference from the results of the Norwegian survey, where Norwegian athletes mainly reported that doping is a problem in elite sport but not in their sport (9). As suspected from the researchers’ informal talks with athletes, we therefore found the perceived safety from cheating to be a critical issue, related to factors both within and external to the international federation. The assessment of how athletes perceive safety from cheating is important because it allows us to evaluate their level of frustration about the fairness of the competitions. This feeling represents a potential stressful factor, as well as an alibi for having a positive attitude towards doping, including the search for performance enhancers to remain competitive.

Additional subjects of interest elucidated by the survey are 1) the respondents’ level of awareness and 2) the athletes’ level of participation in the study. Awareness of the rules appears to be correlated with anti-doping attitudes, thus indicating that educational interventions are important so as to obtain informed anti-doping attitudes, especially among the youngest athletes who have a lower level of awareness.

The somewhat unsatisfactory participation of the athletes in the study might partially be an educational problem. A higher number of respondents would have demonstrated a higher level of interest in the area; however the participation among biathletes was probably influenced by the athletes’ nervousness at the first international event of the season, by the short time they were given to submit the questionnaire, and – for some athletes – by poor comprehension of the four available languages. An alternative interpretation is that some of the non-responders have a generally negative attitude towards any anti-doping interventions.

The APPROVE scale allows the targeted evaluation of the anti-doping activities of the federation under study. For the IBU, considering the 16 questionnaire items where the term “international federation” is included, the average score is good (66.2). The lowest scores are related to concerns about the financial costs and to the number of anti-doping controls carried out, and to the sense that the athletes at high risk of unfair behavior are rarely controlled. High scores (>70) were obtained for the quality of rules, interest in world anti-doping policy, the effectiveness of the medical committee activities and anti-doping services offered.

The APPROVE scale seems to offer important information and highlight critical issues of interest to the stakeholders. APPROVE's main strength is its capacity to shed light on athletes' feelings and concerns, selectively quantifying the different elements representing anti-doping attitudes and exploring the perceived safety of, confidence in, and agreement and satisfaction with the anti-doping program operated by the international federation. This tool enables the representatives of the international federations to evaluate the balance between advantages – in terms of fair competitions – and disadvantages of the anti-doping interventions as perceived by athletes, and search for measures to improve this balance. In addition, the scores attained in the domains and for the single items can potentially be used by anti-doping program managers and administrators as a quality indicator to evaluate their efforts (whether the services are provided by the federation itself or outsourced), and/or as an outcome assessment following the introduction of new interventions (e.g. more tests, new tests, new testing strategies).

The study has some limitations. There might be some response bias deriving from translation issues – despite the languages having been double-checked to guarantee the meaning – or from some athletes' insufficient comprehension of the available languages, even though care was taken to create short questions. Repeatability, as measured in a limited group of subjects, was limited by the necessity of maintaining anonymity. The problem of the missing values, otherwise present in negligible amounts, was managed by arbitrarily assigning a middle – neutral – value on the Likert scale. However for the items with more missing values, we were unable to observe any relevant effects in terms of the reliability or validity of the questionnaire by using additional approaches, e.g. by including the mean value for the domain of the respondent or the whole population sample.

## 8. Conclusions

The research results have shown that it is possible, with a properly developed questionnaire, to measure different aspects of athletes' anti-doping attitudes both to detect critical issues to be improved as well as to evaluate the level of anti-doping awareness. The APPROVE scale potentially enables researchers to evaluate changes in attitude and awareness in a long-term follow-up study following the introduction of new anti-doping strategies.

The first implementation of this tool among elite biathletes indicates a population confident and satisfied with the present anti-doping interventions, encouraged by the anti-doping actions and willing to accept the limitations imposed by the rules in order to obtain more protection from cheating, safety from cheating being the critical domain with the lowest score.

The APPROVE scale, which purposely does not include specific items related to the federation under study, can be used to evaluate the anti-doping attitudes within any international federation, thus enabling possible broad-scale study of attitudes towards anti-doping in sports and a comparison among federations.

## 9. References

1. Hanstad, D.V. & Loland, S. (2009). Elite level athletes' duty to provide information on their whereabouts: Justifiable anti-doping work or an indefensible surveillance regime? *European Journal of Sport Science*, 9 (1), 3-10.
2. Dikic N., Samardzic Markovic S., Mc Namee M. (2011). On the Efficacy of WADAs Whereabouts Policy: Between Filing Failures and Missed Tests *Wirksamkeit der WADA – „Whereabout Policy“ – Dokumentationsprobleme und „Missed Tests“*. *Deutsche Zeitschrift für Sportmedizin*, 62 (10)
3. Manfredini F., Manfredini R., Carrabre J.E., Litmanen H., Zhukovskaja L., Dal Follo D., Haberstroh J. (2002). Competition load and stress in sports: a preliminary study in Biathlon. *Int J Sports Med*, 23, 1-5.
4. Blut D., Santer S., Carrabre J., Manfredini F. (2010). The epidemiology of musculoskeletal injuries among elite biathletes: a preliminary study. *Clin J Sports Med*, 20 (4), 322-4.
5. Manfredini F., Tschukin A., Moran M., Mangolini C., Buzzoni D., Haberstroh J. (1999). Blood testing in Biathlon: Observation of hematocrit values during competitive periods 1994-97. *Int J Sports Med*, 20, 403-406.
6. Manfredini F., Carrabre J.E., Litmanen H., Zhukovskaja L., Malagoni A.M., Dal Follo D., Haberstroh J. (2003). Blood tests and fair competition: the biathlon experience. *Int J Sports Med*, 24, 352-8.
7. Manfredini F., Malagoni A.M., Litmanen H., Zhukovskaja L., Jeannier P., Dal Follo D., Felisatti M., Mandini S., Carrabre J.E. (2009, June). Blood parameters and Biathlon performance. *J Sport Med Phys Fit*, 49 (2), 208-13.
8. Manfredini F., Malagoni A.M., Litmanen H., Zhukovskaja L., Jeannier P., Dal Follo D., Felisatti M., Besseberg A., Geistlinger M., Bayer P., Carrabre J.E. (2011, March). Performance and Blood Monitoring in Sports: The Artificial Intelligence Evoking Target Testing in Anti-doping (A.R.I.E.T.T.A.) Project. *J Sports Med Phys Fitness*, 51 (1), 153-9
9. Hanstad, D.V., Skille, E. & Thurston, M. (2009). Elite Athletes' Perspectives on Providing Whereabouts Information: A Survey of Athletes in the Norwegian Registered Testing Pool. *Sport und Gesellschaft*, 6 (1), 30-46.

10. Mazanov J. (2006). Measuring athlete attitudes towards drugs in sport. *ACSPRI Social Science Methodology Conference 2006*, University of Sydney, Sydney, Australia.
11. Petróczi A. (2007, November). Attitudes and doping: a structural equation analysis of the relationship between athletes' attitudes, sport orientation and doping behaviour. *Subst Abuse Treat Prev Policy*, 9, (2), 34.
12. Laure P., Thouvenin F., Lecerf T. (2001, March). Attitudes of coaches towards doping. *J Sports Med Phys Fitness*, 41 (1), 132-6.
13. Sas-Nowosielski K., Swiatkowska L. (2008, July). Goal orientations and attitudes toward doping. *Int J Sports Med*, 29 (7), 607-12.
14. Somerville S.J., Lewis M., Kuipers H. (2005, August). Accidental breaches of the doping regulations in sport: is there a need to improve the education of sportspeople? *Br J Sports Med*, 39 (8), 512-6; discussion p 516.
15. Mazanov J., Petróczi A., Bingham J., Hollaway A. (2008, April). Towards an empirical model of performance enhancing supplement use: A pilot study among high performance UK athletes. *Journal of Science and Medicine in Sport*, 11 (2), 185-90
16. Moran A., Guerin S., Kirby K., MacIntyre T. (2004, 9 February). Why do athletes cheat? An investigation of Irish athletes' understanding of, and attitudes to cheating behaviour (including doping) in sport. *Commissioned research report to Irish Sports Council*, Dublin, Ireland.
17. Thomas J.O., Dunn M., Swift W., Burns L. (2010). Elite Athletes' Perceptions of the Effects of Illicit Drug Use on Athletic Performance. *Clin J Sport Medicine*, 20, 189-192.
18. Mottram D., Chester N., Gibson J. (2008). Evaluation of a tutor network system for a national education programme on drug-free sport. *Sport in Society*, 11, 560-569.
19. Peterson, R. A. (2000). *Constructing effective questionnaires*. Thousand Oaks, CA: Sage.
20. Sung Heum Lee. Constructing Effective Questionnaires. In: Pershing J. (Ed.), Stolovitch H.D. (Foreword), Keeps E.J. (Foreword). (2006, July) *Handbook of Human Performance Technology: Principles, Practices, and Potential*, 3rd Edition. San Francisco, CA: Pfeiffer
21. Likert, R. (1932). *A technique for the measurement of attitudes*. New York, NY: Columbia University Press
22. Eysenck, S. B. G., Eysenck, H. J., & Barrett, P. (1985). A revised version of the psychoticism scale, *Personality and Individual Differences*, 6, 21-29.

23. Joliffe I.T. & Morgan B.J.T. (1992) Principal component analysis and exploratory factor analysis. *Statistical Methods in Medical Research* 1, 69-95.
24. Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16, 297-334
25. Tabachnick, G.B., & Fidell, L.S. (2001). *Using multivariate statistics (fourth edition)*. Boston, MA: Allyn and Bacon Press, 625



## 10. Appendix

The APPROVE scale:

- A: English version
- B: German version
- C: Russian version
- D: Italian version

**A**

Sect	#	Question
<b>ADOPT</b> (n = 36)	2	In the case of a non-negative sample, I believe that the result management process (anti-doping administrator, hearing panel, CAS...) (of my international federation) safeguards the athlete
	3	It is reasonable (for health, possible manipulations etc.) to restrict athletes from starting if their blood values exceed the competition limits
	4	The present anti-doping rules of my international federation safeguard health and fairness
	7	I fear that my personal information that I give during the anti-doping control will not be kept confidential
	8	The fact that the national and international anti-doping organizations work in coordination with each other is beneficial to the athletes because it improves the anti-doping system
	9	The international competitions in my sport are clean in terms of doping
	10	I feel that the medical committee of my federation is effective in maintaining a safe environment without doping
	11	The athlete biological passport, noting variances in the profile of an athlete's biological markers over a period of time, increases the possibility to detect doping violations in my sport
	13	I feel that the athletes at high risk of unfair behavior are rarely controlled by my international federation
	14	The athlete's duty is only to compete and not to undergo medical anti-doping controls
	15	The mixture of anti-doping tests and educational programs of my international federation is effective
	17	Athletes who are not guilty can be wrongly disqualified
	18	The anti-doping controls are necessary for ensuring fairness of competitions
	19	The anti-doping tests performed by my international federation are current and up-to-date for all doping agents
	21	My federation is a provider of high-quality products in the field of anti-doping
	22	Blood tests should be not performed on athletes of youth categories
	23	Nobody cheats in my sport
	25	It is impossible to fight doping in sport because new substances and methods that improve performance and that cannot be detected are continually available
	26	The anti-doping controls interfere in athletes' training in an adverse way
	27	The international federation I belong to is interested in the world anti-doping policy
	29	I do not trust anti-doping controls managed and performed by my international federation because positive cases are rarely detected in my sport
	30	It is right (reasonable) to undergo blood testing before competitions
	31	There has been an improvement in the anti-doping controls performed by my international federation
	33	The number of out-of-competition anti-doping controls performed by my international federation is sufficient
	34	I believe that is right to restrict the daily activities of those athletes included in the registered testing pool by way of the athlete whereabouts requirement
	35	I fear that the urinary sample collected during the anti-doping control can have doping agents added by someone else
	38	The number of in-competition anti-doping controls performed by my international federation is sufficient
	39	The anti-doping program of my international federation maintains a safe environment in terms of fairness of competitions
	40	I do not believe in anti-doping controls because they can be easily manipulated
	41	My international federation adequately informs athletes on anti-doping matters
	43	The result of the competitions in my sport reflects the quality of athletes and of their technical materials
	44	Anti-doping controls should be carried out at any time of the day
	47	I fear that my biological sample will not be anonymous when analyzed at the laboratory
	49	Anti-doping controls are effective in our sport to improve the environment in terms of fairness of competition results
	51	My international federation invests enough money in the anti-doping field
	53	The anti-doping personnel in my international sport federation are professional
<b>AWARENESS</b> (n = 11)	1	The prohibited list of the World Anti-Doping Agency is updated every year
	6	I have never read the anti-doping rules of my international federation because they are difficult and should be explained to me by an expert
	12	An athlete can be sanctioned for doping only if his/her biological sample is positive at the anti-doping control
	16	The prohibited list of the World Anti-Doping Agency and the sanctions for positive athletes are different for each international Olympic sport federation
	24	The athlete has both duties and rights during the anti-doping control
	28	The attempted use, the possession or trafficking of products included in the prohibited list of the World Anti-Doping Agency are a severe violation of anti-doping rules and call for a sanction to the athlete or to the technician involved
	37	According to the WADA code, it is each athlete's personal duty to ensure that no prohibited substance enters his or her body
	42	According to the WADA code, the doctor of my team is the only person responsible for ensuring that no prohibited substance enters my body
	46	If an athlete has a documented medical condition requiring the use of a prohibited substance or a prohibited method, that athlete may request a therapeutic use exemption
	50	In my federation anti-doping controls performed include "in competition", "out of competition", and target tests
	52	I know the anti-doping rules of my international federation

**B**

Sect	#	Question
ADOPT (n = 36)	2	Im Fall einer nicht-negativen Probe, glaube ich, dass der Ergebnismangement-Prozess (Anti-Doping-Administrator/-in, Anhörungsgremium, CAS...) (meines internationalen Verbandes) den Athleten/die Athletin schützt
	3	Es ist vernünftig (für die Gesundheit, hinsichtlich möglicher Manipulationen etc.), einen Athleten/eine Athletin vom Start auszuschließen, wenn seine/ihre Blutwerte die Wettkampfgrenzen überschreiten
	4	Die aktuellen Anti-Doping-Regeln meines internationalen Verbandes schützen Gesundheit und Fairness
	7	Ich befürchte, dass meine während der Anti-Doping-Kontrolle gegebenen persönlichen Informationen nicht vertraulich behandelt werden
	8	Die gemeinsamen Aktivitäten der nationalen und internationalen Anti-Doping-Organisationen sind für den Athleten/die Athletin vorteilhaft, weil sie die Anti-Doping-Maßnahmen verbessern
	9	Die internationalen Wettkämpfe meiner Sportart sind, was Doping anbelangt, sauber
	10	Ich bin der Meinung, dass es dem medizinischen Komitee meines Verbandes gelingt, ein sicheres, dopingfreies Umfeld zu gewährleisten
	11	Der biologische Pass des Athleten/der Athletin, mit dem Abweichungen im Profil seiner/ihrer biologischen Marker langfristig festgestellt werden, erhöht die Wahrscheinlichkeit, Dopingverstöße in meiner Sportart aufzudecken
	13	Ich bin der Meinung, dass Athleten/-innen, bei denen eine hohe Wahrscheinlichkeit besteht, sich unfair zu verhalten, selten von meinem internationalen Verband kontrolliert werden
	14	Die Pflicht des Athleten/der Athletin besteht nur darin, Wettkämpfe zu bestreiten und nicht, sich medizinischen Anti-Doping-Kontrollen zu unterziehen
	15	Die Mischung aus Anti-Doping-Kontrollen und dem Aufklärungsprogramm meines internationalen Verbandes ist effektiv
	17	Unschuldige Athleten/-innen können fälschlich disqualifiziert werden
	18	Die Anti-Doping-Kontrollen sind notwendig, um faire Wettkämpfe sicherzustellen
	19	Die Anti-Doping-Tests, die von meinem internationalen Verband durchgeführt werden, sind modern und hinsichtlich aller Dopingmittel auf dem neuesten Stand
	21	Mein Verband liefert im Bereich Anti-Doping qualitativ hochwertige Arbeit
	22	Die Bluttests sollten bei Athleten/-innen der Jugendkategorie nicht durchgeführt werden
	23	Niemand betrügt derzeit in meiner Sportart
	25	Es ist unmöglich, Doping im Sport zu bekämpfen, weil neue Wirkstoffe und Methoden, die die Leistung steigern und nicht aufgedeckt werden können, kontinuierlich verfügbar sind
	26	Die Anti-Doping-Kontrollen beeinflussen das Training der Athleten/-innen in nachteiliger Weise
	27	Der internationale Verband, dem ich angehöre, interessiert sich für die Welt-Anti-Doping-Politik
	29	Ich misstraue den Anti-Doping-Kontrollen, die von meinem internationalen Verband organisiert und durchgeführt werden, weil in meiner Sportart positive Fälle selten aufgedeckt werden
	30	Es ist richtig (vernünftig), vor Wettkämpfen Bluttests unterzogen zu werden
	31	Die Anti-Doping-Kontrollen, die von meinem internationalen Verband durchgeführt werden, verbessern sich stetig
	33	Die Anzahl von Trainings-Anti-Doping-Kontrollen, die mein internationaler Verband durchführt, ist ausreichend
	34	Ich glaube, dass es richtig ist, die täglichen Aktivitäten der Athleten/-innen, die dem Registered Testing Pool angehören, derart einzuschränken, wie es die Anforderungen an Athleten/-innen bezüglich Aufenthaltsort und Erreichbarkeit vorsehen
	35	Ich befürchte, dass die Urinprobe, die während der Anti-Doping-Kontrolle entnommen wird, von jemand anderem hinzugefügte Dopingmittel enthalten kann
	38	Die Anzahl von Wettkampf-Anti-Doping-Kontrollen, die mein internationaler Verband durchführt, ist ausreichend
	39	Das Anti-Doping-Programm meines internationalen Verbandes gewährleistet ein sicheres Umfeld hinsichtlich der Fairness von Wettkämpfen
	40	Ich glaube nicht an Anti-Doping-Kontrollen, weil sie leicht manipuliert werden können
	41	Mein internationaler Verband informiert die Athleten/-innen ausreichend über Anti-Doping-Angelegenheiten
	43	Das Ergebnis der Wettkämpfe in meiner Sportart reflektiert die Qualität der Athleten/-innen und des technischen Materials
	44	Anti-Doping-Kontrollen sollten zu jeder Uhrzeit durchgeführt werden
	47	Ich befürchte, dass meine biologische Probe nicht anonym ist, wenn sie im Labor analysiert wird
	49	Anti-Doping-Kontrollen sind in unserer Sportart effektiv, um das Umfeld hinsichtlich der Fairness von Wettkampfergebnissen zu verbessern
	51	Mein internationaler Verband investiert im Bereich Anti-Doping genug Geld
	53	Das Anti-Doping-Personal in meinem internationalen Sportverband ist professionell
AWARENESS (n = 11)	1	Die Liste verbotener Wirkstoffe und verbotener Methoden der Welt-Anti-Doping-Agentur wird jedes Jahr aktualisiert
	6	Ich habe die Anti-Doping-Regeln meines internationalen Verbandes bis jetzt nicht gelesen, weil sie schwierig sind und mir von einem Experten erklärt werden sollten
	12	Ein Athlet/eine Athletin kann für Doping nur sanktioniert werden, wenn seine/ihre biologische Probe bei der Anti-Doping-Kontrolle positiv ist
	16	Die Liste verbotener Wirkstoffe und verbotener Methoden der Welt-Anti-Doping-Agentur und die Sanktionen für positiv getestete Athleten/-innen sind für jeden internationalen olympischen Sportverband unterschiedlich
	24	Der Athlet/die Athletin hat während der Anti-Doping-Kontrolle sowohl Pflichten als auch Rechte
	28	Der Versuch der Anwendung, der Besitz oder das Inverkehrbringen von Produkten, die in die Liste verbotener Wirkstoffe und verbotener Methoden der Welt-Anti-Doping-Agentur aufgenommen sind, stellen einen wesentlichen Verstoß gegen die Anti-Doping-Regeln dar und erfordern eine Sanktion gegen den Athleten/die Athletin oder das technische Personal, der/die bzw. das daran beteiligt ist
	37	Gemäß dem WADA-Code ist es die persönliche Pflicht eines jeden Athleten/einer jeden Athletin, dafür zu sorgen, dass kein verbotener Wirkstoff in seinen/ihren Körper gelangt
	42	Gemäß dem WADA-Code ist der Arzt meiner Mannschaft der einzige Verantwortliche dafür, dass kein verbotener Wirkstoff in den Körper des Athleten/der Athletin gelangt
	46	Bei Vorhandensein einer nachgewiesenen Krankheit, welche die Anwendung eines verbotenen Wirkstoffs oder einer verbotenen Methode erfordert, kann ein Athlet/eine Athletin eine Ausnahmegenehmigung zur therapeutischen Anwendung beantragen
	50	In meinem Verband durchgeführte Anti-Doping-Kontrollen umfassen „Wettkampfkontrollen“, Trainingskontrollen und Zielkontrollen
	52	Ich kenne die Anti-Doping-Regeln meines internationalen Verbandes

## C

Sect	#	Question
ADOPT (n = 36)	2	В случае атипичного результата тестирования я верю, что процедуры моей Федерации по ведению данного вопроса (Комиссия IBU по заслушиванию случаев допинга, спортивный арбитражный суд, апелляционные и дисциплинарные комиссии) стоят на защите спортсмена
	3	Если показатели анализов крови превышают установленные нормы соревнований, разумно отстранить спортсменов от старта (для их же здоровья, во избежании подтасовок и т.д.)
	4	Действующие антидопинговые правила защищают здоровье спортсмена и честность проводимых соревнований
	7	Я боюсь, что конфиденциальная информация, предоставляемая мною в ходе допинг-контроля, не содержится в секрете
	8	Согласованная деятельность национальных и интернациональных организаций является выигрышной для спортсменов, так как она усиливает работу в области антидопинга
	9	Международные соревнования в моем виде спорта не «загрязнены» допингом
	10	Я вижу, что медицинский комитет моей международной федерации принимает эффективные меры для поддержания «чистоты» среды без допинга
	11	Биологический паспорт спортсмена, фиксирующий изменения биологических маркеров спортсмена на протяжении определенного периода времени, повышает вероятность обнаружения допинговых нарушений в моем виде спорта
	13	Я считаю, моя международная Федерация не контролирует должным образом спортсменов, которые имеют повышенный риск использования допинга
	14	Долг спортсмена – участвовать в соревнованиях, а не подвергаться допинг-контролям
	15	Сочетание допинг-контролей и образовательной программы, посвященной вопросам антидопинга, моей международной Федерации является эффективным
	17	Невиновные спортсмены могут быть незаслуженно дисквалифицированы
	18	Допинг-контроли необходимы для обеспечения корректности проводимых соревнований
	19	Антидопинговое тестирование, проводимое моей международной федерацией, является актуальным и учитывает все вновь появляющиеся допинговые агенты
	21	Моя международная федерация предоставляет услуги высокого качества в области антидопинга
	22	Не следует подвергать забору крови спортсменов юношеских категорий
	23	В моем виде спорта никто не обманывает
	25	В спорте невозможно противодействовать допингу, потому что постоянно появляются новые субстанции и методы для повышения физической работоспособности, недоступные выявлению
	26	Допинг-контроли неблагоприятно сказываются на тренировках и мешают им
	27	Международная федерация, членом которой я являюсь, заинтересована в глобальной антидопинговой политике
	29	Я не доверяю допинг-контролям, организуемым и проводимым моей международной федерацией, потому что в моем виде спорта редко выявляются выявляющие атлеты с положительным результатом теста
	30	Быть подвергнутым забору крови перед соревнованиями - это правильно (разумно)
	31	В последнее время уровень допинг-контролей, проводимых моей международной федерацией, повысился
	33	Моя международная федерация проводит достаточное количество допинг-контролей во внесоревновательный период
	34	Думаю, это правильно ограничивать свободу действий спортсменов, которые включены в регистрируемый пул тестирования, путем требований относительно их доступности, для обеспечения проведения допинг-контролей
	35	Я боюсь, что кто-нибудь может добавить вещества, содержащие допинг, в пробу мочи, собранную у меня на допинг-контроле
	38	Моя международная федерация проводит достаточное количество допинг-контролей в соревновательный период
	39	Антидопинговая программа международной Федерации, в которой я состою, заботится об атмосфере справедливости и честности проводимых соревнований
	40	Я не верю в допинг-контроль, потому что его результаты можно легко подтасовать
	41	Моя международная федерация предоставляет спортсменам исчерпывающую информацию в вопросах, касающихся проблем допинга
	43	Результаты спортивных соревнований в моем виде спорта отображают уровень подготовки спортсменов и качество технических материалов
	44	Допинг-контроли должны проводиться в любое время суток
	47	Я боюсь, что мои биологические пробы (моча, кровь и т.д.) анализируются в лаборатории не в анонимном порядке
	49	Допинг-контроли в нашем виде спорта эффективны для улучшения атмосферы справедливости и честности проводимых соревнований
	51	Моя международная федерация вкладывает достаточно средств в область антидопинга
	53	Люди, занимающиеся борьбой с допингом в моей международной спортивной федерации – это профессионалы
AWARENESS (n = 11)	1	Запрещенный список с запрещенными субстанциями и методами обновляется ВАДА каждый год
	6	Я никогда не читал/а антидопинговые правила моей Международной Федерации, потому что они очень сложные и должны быть мне объяснены специалистом
	12	К спортсмену могут быть применены штрафные санкции за нарушение антидопинговых правил только в случае положительного результата его биологических проб на допинг
	16	Запрещенные субстанции и методы, перечисленные в Запрещенном списке ВАДА, а так же санкции для спортсменов с положительным результатом допинг-теста различаются для разных олимпийских международных спортивных федераций
	24	Во время допинг-контроля у спортсмена имеются как обязанности, так и права
	28	Попытка использования, обладание или распространение субстанций, внесенных в Запрещенный список ВАДА, представляет собой серьезное нарушение антидопинговых правил и влечет за собой наложение штрафных санкций на спортсмена, тренерский штаб или технический персонал
	37	Согласно Кодексу ВАДА, каждый спортсмен обязан лично следить за тем, чтобы никакая запрещенная субстанция не попала в его организм
	42	Согласно Кодексу ВАДА, только врач моей команды несет единоличную ответственность за то, чтобы никакая запрещенная субстанция не попала в организм спортсмена
	46	Если по засвидетельствованным медицинским показаниям требуется прием запрещенной субстанции или применение запрещенного метода, спортсмен может запросить разрешение на терапевтическое использование субстанции или метода, включенных в Запрещенный список ВАДА
	50	Международная Федерация, в которой я состою, проводит допинг-контроли во время соревнований, во внесоревновательный период, а так же целевое тестирование
	52	Я знаю антидопинговые правила моей международной Федерации

**D**

Sect	#	Question
ADOPT (n = 36)	2	Nel caso di un campione non-negativo, credo che il processo di gestione (Amministratore anti-doping, Commissione giudicante, Corte di arbitro dello sport) della mia federazione internazionale salvaguardino l'atleta
	3	È ragionevole (per motivi di salute, possibili azioni illecite etc.) non consentire la partecipazione alle gare agli atleti i cui valori ematici eccedono i limiti consentiti
	4	Gli attuali regolamenti in materia di antidoping tutelano la salute dell'atleta e la correttezza delle gare
	7	Temo che le informazioni riservate che fornisco durante il controllo antidoping non siano mantenute segrete
	8	Il fatto che le organizzazioni anti-doping nazionali ed internazionali lavorino in stretta collaborazione è favorevole agli atleti perché migliora il sistema anti-doping
	9	Le competizioni internazionali nel mio sport non sono condizionate dal doping
	10	La commissione medica della mia Federazione Internazionale agisce efficacemente per mantenere un ambiente sicuro libero dal doping
	11	Il passaporto biologico dell'atleta, registrando i cambiamenti nel tempo del profilo dei markers biologici dell'atleta, aumenta la possibilità di scoprire le violazioni del regolamento anti-doping nel mio sport
	13	La mia Federazione Internazionale non controlla a sufficienza gli atleti che secondo me sono più a rischio per uso di sostanze dopanti
	14	Il dovere dell'atleta è gareggiare e non essere sottoposto a controlli antidoping
	15	La combinazione di test antidoping e programmi educativi in materia proposti della mia federazione internazionale è efficace per l'atleta
	17	Possono essere ingiustamente squalificati atleti non colpevoli
	18	I controlli antidoping sono necessari per assicurare la correttezza delle gare
	19	I test anti-doping condotti dalla mia federazione internazionale sono aggiornati relativamente a tutte le nuove sostanze dopanti
	21	Nel campo dell'antidoping la mia Federazione Internazionale fornisce servizi di alta qualità
	22	Non si dovrebbe prelevare il sangue agli atleti delle categorie giovanili
	23	Nel mio sport nessuno imbroglia
	25	E' impossibile contrastare il doping nello sport perché sono continuamente disponibili nuove sostanze e metodi (non rilevabili) per migliorare la performance fisica
	26	I controlli anti-doping interferiscono negativamente negli allenamenti degli atleti
	27	La Federazione Internazionale a cui appartengo è interessata alla politica anti-doping mondiale
	29	Non ho fiducia nei controlli anti-doping messi in atto dalla mia federazione internazionale perché raramente si scoprono atleti positivi
	30	E' giusto essere sottoposti a prelievi di sangue prima delle gare
	31	Il livello dei controlli antidoping condotti dalla mia Federazione Internazionale è migliorato
	33	Il numero di test antidoping a sorpresa "out-of-competition" condotti dalla mia Federazione Internazionale è sufficiente
	34	Credo sia giusto limitare la libertà d'azione nelle attività quotidiane degli atleti inseriti nel Gruppo Registrato ai fini dei controlli (Registered Testing Pool), attraverso la necessità di fornire informazioni sui propri spostamenti
	35	Temo che il campione di urine raccolto durante il controllo antidoping possa essere contraffatto con sostanze dopanti immesse da qualcun altro
	38	Il numero di test antidoping condotti in gara dalla mia federazione internazionale è sufficiente
	39	Il programma anti-doping della Federazione Internazionale a cui appartengo mantiene un ambiente sicuro per quel che riguarda la correttezza delle competizioni
	40	Non ho fiducia nei controlli antidoping perché possono essere facilmente manipolati
	41	La mia Federazione Internazionale informa adeguatamente gli atleti sulle problematiche dell'anti-doping
	43	Il risultato delle gare nel mio sport rispecchia unicamente la qualità degli atleti abbinati ai materiali tecnici disponibili
	44	I controlli antidoping dovrebbero essere effettuati a ogni ora del giorno
	47	Temo che il mio campione biologico non sia anonimo quando viene analizzato nei laboratori
	49	I controlli antidoping nel nostro sport sono efficaci per migliorare l'ambiente sportivo relativamente alla regolarità dei risultati delle competizioni
	51	La mia Federazione Internazionale investe denaro a sufficienza nel campo dell'antidoping
	53	Nel mio sport il personale che si occupa dei controlli antidoping è professionale
AWARENESS (n = 11)	1	La lista dei farmaci e metodi proibiti della World Anti-Doping Agency viene aggiornata ogni anno
	6	Non ho mai letto le regole anti-doping della mia federazione perché sono difficili da comprendere e dovrebbero essermi spiegate da un esperto
	12	Un atleta può essere sanzionato per doping solo se un suo campione biologico risulta positivo al test antidoping
	16	La lista dei farmaci e metodi proibiti della World Anti-Doping Agency e le sanzioni per gli atleti trovati positivi sono diversi per le diverse federazioni sportive internazionali olimpiche
	24	Durante il controllo antidoping l'atleta ha sia doveri che diritti
	28	Il tentato uso, il possesso o lo smercio di sostanze inserite nella lista delle sostanze vietate dalla WADA rappresentano una grave violazione antidoping e comportano una sanzione all'atleta o al tecnico coinvolto
	37	Secondo il codice della World Anti-Doping Agency è compito di ogni atleta assicurarsi che nessuna sostanza proibita entri nel proprio corpo
	42	Secondo il codice della World Anti-Doping Agency il mio medico di squadra è il solo responsabile delle sostanze che entrano nel corpo dell'atleta
	46	Se un atleta presenta una patologia documentata che richieda l'uso di una sostanza o di un metodo vietato, può chiederne l'utilizzo per motivi terapeutici
	50	La Federazione Internazionale a cui appartengo effettua controlli antidoping durante le gare, a sorpresa al di fuori delle gare ("out of competition") e mirati
	52	Conosco il regolamento anti-doping della mia federazione internazionale