

# RISKS AND BENEFITS IN PRACTICING TRAIL RUNNING

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**Abstract:** *Although it predates modern athletics, trail running is a sport branch recently introduced in the competition calendar of the Romanian Athletics Federation, in the context of which at international level it is frequently discussed about introducing this sport branch into the Olympic Games.*

*Nationally, we currently assist at the promotion of a large number of competitions as well as a continuous growth of the indicator of participation and interest of collateral factors. These unique types of competition events create premises for new research directions that concern both internal and external phenomena of the specific instruction process, moreover of the different ways of approach, less concerned nationally and internationally.*

*This article aims to surprise through interviews and processed pieces of information of the specific literature, positive as well as negative aspects that are contested by athletes and coaches approaches in trail running competitions and based on these aspects I highlight in a holistic manner, necessary synergies from the perspective of factors and training methods on the following sequences: competition, recovery, prevention and/ or regeneration, depending on each case. I consider that, highlighting disturbing factors as well as of benefic aspects that can be associated with practicing trail running, will increase the efficiency in the coaching process, being reflected in the improvement of the performance level and in diminishing risks that concern body integrity of its practicers.*

**Key words:** *trail running, instruction process, injury risk, prevention, recovery.*

## 1. Introduction

Before modern athletics, the first references about trail running were found in 1068 in Scotland when the king was electing his messenger after a competition that involved ascending and descending a mountain [12]. In Romania, the first National Championship of Trail Running took place in 09 August 2008 in Piatra Arsa, Sinaia. Currently the number of this

kind of competitions is increasing not only internationally, but also nationally [10]. This athletic branch, through its particularities characteristic to effort, through the nature of the environment and capacities of practicer subjects, creates the premises of two important components that are divided in risks and benefits. These, have at foundation the specificity of endurance effort; the intensity variable, volume and complexity through the tactics

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and dynamics of the itinerary profile, with alternating sequences of ascending, descending and flat; somato-functional model of the athlete; the unknown of the external environment (surface, temperature, humidity, atmospheric pressure, altitude difference, intensity of wind and of solar radiations, social environment, interdisciplinary team) and of the internal environment (through state of health, fatigue level, fitness level, recovery capacity, current level of manifestation of qualities and motric skills, psychological capacities and the emotional equilibrium of practicants. The management of aspects previously approached creates the frame of some objective variables in the athletic activity through the multitude of risks and benefits, these depending to a high degree on the mastery of approaching in practice of coaches and athletes. Therefore, the process efficiency demands a permanent evaluation of factors involved in effort, due to the intense and varied requests at which the body of an athlete is predisposed in trail running contests. These are the reasons why I realised and applied a questionnaire to the practicants of this specific effort, to establish risks and benefits. Obtaining through the quality of the operational model, qualitative benefits of practicing trail running, but in the same time, reporting risks that practicants are predisposed to [9].

## **2. Hypothesis of the Research**

I consider that risk management in trail running can be defined as 'the art of keeping uncertainty under control' through prevention methods. Also, benefits of specific effort in trail running are numerous due to the effects produced at the body level from the transformation and adjustment point of views.

Specialization level increases in the same time with the pieces of information and experience encountered. So, the mastery of coaching in this sport branch lies in permanent adjustment to new, imposed by the nature and way of effort. The need of informing towards the aspects seen as risks or benefits by the specialists, impose researches and specialized approaches, with the aim of recording the encountered variables in the athletic activity of training or competition. The investigation that I realized started from the following hypothesis:

The lack of theoretical and practical knowledge, always in the activity of human factors, that approach trail running, expose these to situations of risk or incompatibility of using premises that create benefits. So, practicants of trail running, see the risks and benefits in a diversified way and with a personal level of intensity.

## **3. Material and Method**

The degree of actuality of the present study comes out from the need for knowing risks and benefits of trail running efforts, reported as much as possible at the diversity of determinant factors in transformation processes, adjustment and acclimatization of athletes.

### ***Period and place of research***

The period of realising this research was the competition year 2013-2014 for both amateur and professional athletes. Cities of the research were Brasov and Vatra Dornei.

### ***Subjects and groups***

In the current study I approached two athletes groups: one composed of 6 professional athletes and another one composed of 10 amateur athletes, all of them participants in trail running

competitions, ranked top 10 at national level.

The data obtained from my investigation, try to show the multiplurifactorial diversity of benefic influence as well as risky in training sessions for trail running. I also want to highlight the relationship between risk and benefit through the practical activity that was performed.

I tried through the directions of my research to answer the following questions:

- Which are the internal and external factors that influence our activity?
- Which are the systems where transformations and/ or adjustments occur after trail running?
- What benefits or risks occur while practicing trail running?

The article is part of my task and is included in an ample thematic that through he importance of theoretical and methodical aspects approached, contributes to research new directions of research in trail running.

### ***Applied tests***

Trail running represents a sport branch that offer a large complexity regarding all the involved factors at the level of requests, transformations and adjustments. Thus, due to the high number of risks and benefits as well as the fact that the type of effort is interdisciplinary influenced (by athletics, tourism guidance and alpinism) with many request, represents a big difficulty in approaching the proposed thematic. The methods used in research were: specialty bibliographic documentation, realised in order to show the main risks and benefits, in the research area regarding the body of the athlete reported to internal and external factors decisive in trail running. Due to the recent apparition in competitions and not least of the decreased approach level in specialty literature, I choose as main means of research the investigation method, realised

through interviews holden with athletics specialists (coaches, athletes, organizers of trail competitions) and with those who approach in athletic practice trail running, among the classic ones. Through the graph method there are highlighted and exposed datas of the results after the research.

In specialty literature, thematic approach illustrates the decisive portrait in these sport tests. Psychological and physical limits are many times outdated, this fact leading to limits in superior endurance efforts adjustment specific through particularities such as volume, intensity and complexity related to particularities of the practican person. Consequently, trail running produces transformations, adjustments and disorders to the systems of the body that is subject to the stymulus cumulation. Regarding respiratory system, environmental factors through the differences in altitude, of increased pressure, level of O<sub>2</sub> decreases or oscillates depending on the case and the air concentration changes once with the altitude (through altitude difference, climate and vegetation). Thus, Durand and Jurnet talk about [5] muscles involved while inhaling (especially the diafragm) through contraction, change the structure of the thorax and the air concentration causes a passive exhalation that favors relaxation of the muscles involved during exhalation. Another important aspect is represented by the hemoglobin level with the main role in tisular oxygenation that on the base of oxihemoglobin contributes to the increase in the capacity of adapting to effort. The difference in temperature inside the body and outside environment or the increased body temperature after effort produces a PH decrease.

Regarding circulatory system, any small change has a decisive role in the function and adjustment of the athlete's body to the complexity and diversity of trail running effort, through which the nature of motric

acts limit the capacity, resulting the adjustments to the stimulus parameters. Blood transports O<sub>2</sub>, CO<sub>2</sub>, nutrients and hormones to tissues. Specific to endurance tests are red blood cells that contain hemoglobin. The increased number of blood cells increases the blood viscosity leading up to thrombosis and embolism. The tight bond between circulatory and respiratory systems, during the effort performed at oscillatory altitude and on the background of endogen hypoxia, secretes EPO hormon by the kidney. An increased level of the hematocrit produces deshydration, a state of risk for athletes.

At the muscular system level, quality of the muscle fibers is provided by proteins. As a hydration level; oxygenation capacity, contraction capacity (concentric, eccentric and izometric); energetic resources of ATP, CP and glicogen; by the number of fibers of I type for endurance and a decreased activity level for the aerobic system. Functional and celular adjustment have at foundation structure-function relationship [5].

Endurance training needs as performance model individuals with developed physical capacities (resistance and force), technical and tactical capacities specialized (with running economically in order to avoid injuries and body disturbances), with a developed constitutional profile (systems of human body, developed so that all work as a team) and a high personality level (intellectual capacity, motivation, altitude) [11].

Recovery is the least studied and understood component of the effort-adjustment cycle to effort [4]. The variety of ways used in athletic recovery, can be found also in kinetotherapy, these representing ways of making more efficient differentiated influences, applied where it is desired to interfere. In this context, Cioroiu [3] sustains that 'stretching is recommended by athletes, coaches, kinetotherapists not only for

preventing possible traumas, but also for increasing performances'. Stretching after effort induces and optimizes a state of relaxation and muscular recovery and prevents injuries [1]. Implementing recovery and profilaxy strategies according to individual needs, decrease the risk of overwhelming the fitness level and reduces the risks to injure. After these repetitions, adjustments are produced to the specific effort for training and progress in performance. Recovery plans at altitude have metabolic valence, circulatory, neuromuscular, respiratory, endocrine that produce numerous adjustments [6].

### ***Statistical processing***

In order to complete the data of the proposed investigation field, I applied a questionnaire to athletes that are subjects to the research that aims to show the states and sensations felt in specific efforts in trail running. The results of these questionnaires were discussed with two of the questionned athlete's coaches, that approach trail running in practice and have a role in organizing competitions. The pieces of information will be compressed into conclusions towards risks and benefits in trail running. The questionnaire for athletes was set up according to risks and benefits that can be found in speciality literature. This fact, tries to show if the Romanian athletes encounter in practice aspects approached by foreign specialists. The questionnaire contains five questions that have 4 risks and 4 benefits that will be appreciated according to the following value scale: 1- to a very small extent, 2 – to a small extent, 3 – to some extent, 4 – to a large extent, 5 – to a very large extent. In statistic processing, in order to ease the calculus I realized the following correlation on the graphs: I connected appreciation 5 and 4 to a very large extent with number 3 on the graph, I connected appreciation 3 with 2 to some extent with 2

on the graph and finally appreciation number 1 remains unchanged.

The questionnaire was delimited in tree directions: ergofiziology, psychology and nutrition on the two componets of risk and benefit.

Through the applied questionnaire, at the first question there are included pieces of information related to senzations felt at muscle level after specific efforts practiced in trail running with directions on the two branches of risks and benefits.

At the first question, concerning benefits regarding adjusting muscle tonus, from all amateur athletes, one (10%) answered to a very small extent, 6 (60%) to some extent 3 (30%) answered to a very large extent; while in case of professional athletes all 6 (100%) answered to a very large extent. Concerning the increase in the trophicity level, 2 amateur athletes (20%) answered

to some extent while the other 8 (80%) answered to a very large extent; while in case of professional athletes all 6 (100%) answered to a very large extent. Regarding muscular oxygenation and vascularization from all the amateur athletes, 2 (20%) answered to a very small extent, 6 (60%) answered to some extent and 2 (20%) answered to a very large extent; while in case of professional athletes one (16,66%) answered to some extent and the rest of 5 (83,33%) answered to a very large extent. Qualitative increase of muscle fibers was appreciated by amateur athletes as follows: 2 (20%) answered to a very small extent, 6 (60%) to some extent and 2 (20%) answered to a very large extent. In case of professional athletes one (16,66%) answered to some extent and 5 (83,33%) to a very large extent.

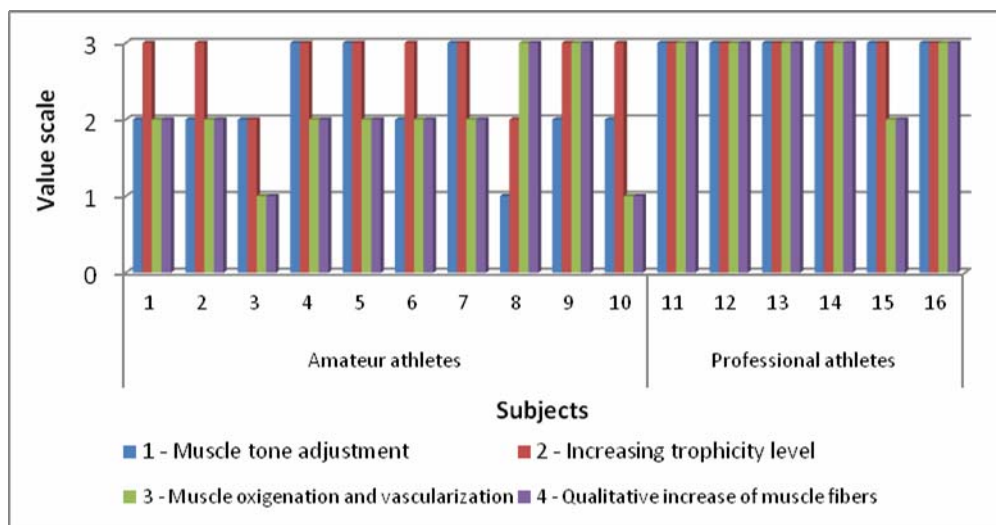


Fig. 1. *Declaratory frequency of benefits felt at muscle level after specific efforts performed in trail running*

Concerning risks related to muscle pain for amateur athletes, 2 (20%) answered to some extent and 8 (80%) answered to a very large extent; while in case of professional athletes 3 (50%) answered to some extent and the other 3 (50%)

answered to a very large extent. Concerning muscle contractions, from all amateur athletes 2 (20%) answered to some extent and 8 (80%) answered to a very large extent; while in case of professional athletes 2 (33.33%) answered

to some extent and the other 4 (66,66%) answered to a very large extent. Muscle fatigue was appreciated by a single amateur athlete (10%) to some extent and the rest of 9 (90%) answered to a very large extent; while in case of professional athletes 2 (33.33%) answered to some extent and 4 (66,66%) answered to a very large extent. Deshydration was appreciated by amateur athletes as follows: 3 (30%) answered to some extent and 7 (70%) answered to a very large extent. In case of

professional athletes 5 (83,33%) answered to some extent and a single athlete (16,66%) answered to a very large extent. Analysing all these data, it can be established, at the muscular system level, an accumulation of risks that bring negative influences towards the physical condition to both amateur and professional athletes.

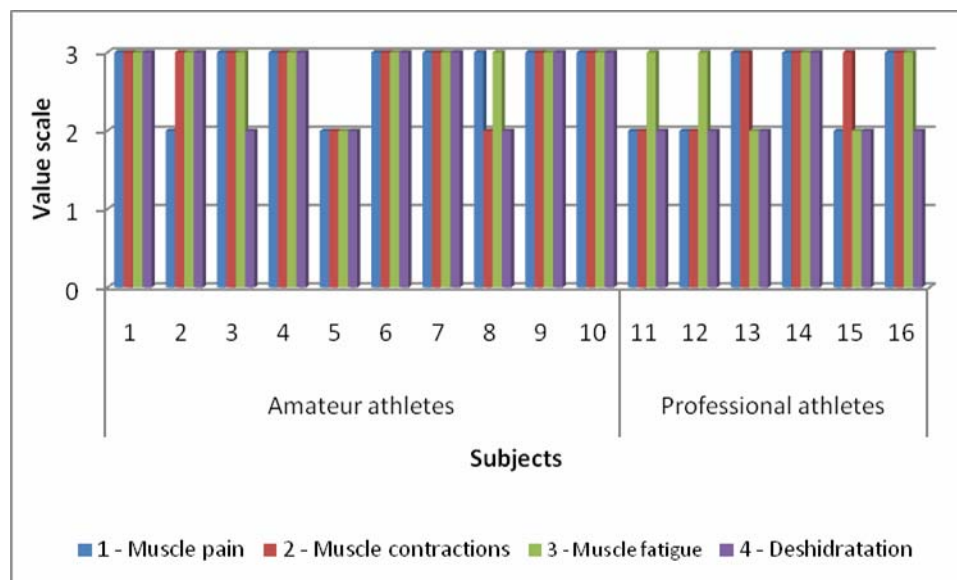


Fig. 2. *Declaratory frequency of risks felt at muscle level after specific efforts performed in trail running*

Thus, I conclude that trail running positively influences the muscular system through qualitative and quantitative benefits reminded previously. Regarding risks, new research directions are imposed to multidisciplinary approach this issue, frequently encountered in professional sport.

At the second question, related to the states caused by nutrition in specific efforts performed in trail running, the respondents prioritized nutritional risks and benefits.

Regarding the satiety, from all amateur athletes only one (10%) answered to a very small extent, 4 (40%) answered to some extent and 5 (50%) answered to a very large extent; while in case of professional athletes only one (16,66%) answered to some extent and 5 (83,33%) to a very large extent. Regarding hydration, 5 (50%) from the amateur athletes appreciated to some extent and the other 5 (50%) appreciated to a very large extent; while in case of professional athletes all 6 (100%) answered to a very small extent.

Concerning the glycemic index level, one amateur athlete (10%) answered to a very small extent, 7 (70%) to some extent and 2 (20%) answered to a very large extent; in case of professional athletes only one (16,66%) answered to some extent and 5 (83,33%) answered to a very large extent.

Having an easy digestion was appreciated by amateur athletes as follows: 3 (30%) answered to a very small extent, 6 (60%) to some extent and one (10%) answered to a very large extent. In case of professional athletes all 6 (100%) answered to a very large extent.

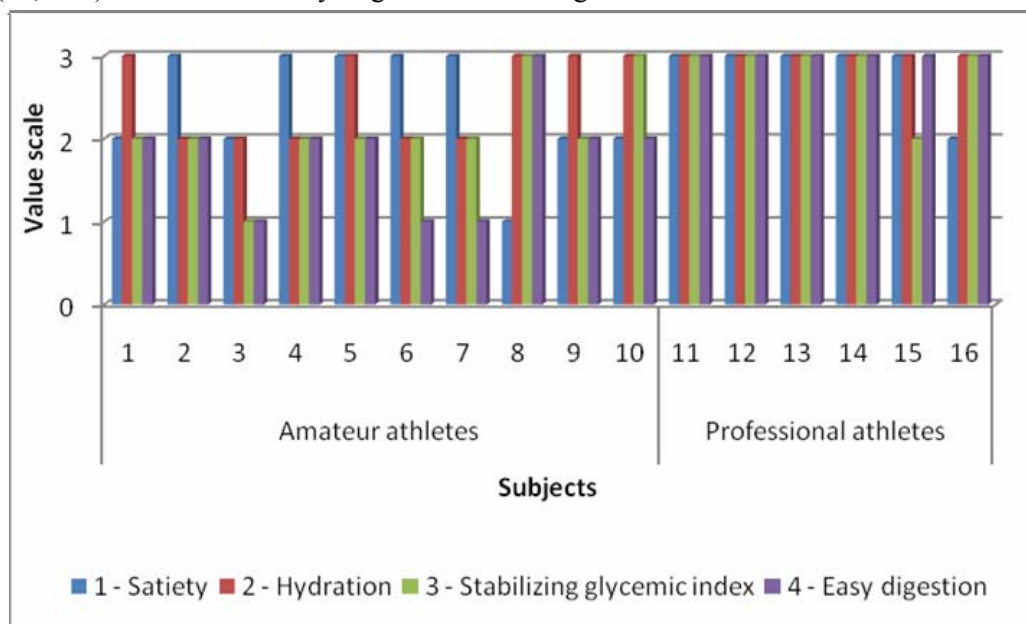


Fig. 3. *Declaratory frequency of benefits felt regarding nutrition after specific efforts performed in trail running*

Concerning risks regarding dizziness and the decrease of blood sugar level was considered by 5 (50%) amateur athletes important to some extent and by 5 (50%) to a very large extent; while in case of professional athletes all 6 (100%) answered to some extent. Regarding stomach ache, 4 (40%) amateur athletes answered to some extent and the rest of 6 (60%) answered to a very large extent; whereas in case of professional athletes 5 (83.33%) answered to some extent and one (16,66%) answered to a very large extent. Nausea and vomiting were appreciated by 5 (50%) amateur athletes to some extent and by 5 (50%) to a very large extent; while in case of professional athletes all 6 (100%) answered to some extent.

Digestive problems were appreciated by amateur athletes as follows: 3 (30%) answered to some extent and 7 (70%) answered to a very large extent. In case of professional athletes all 6 (100%) answered to some extent.

Following these datas, I observe an important difference between the nutrition of amateur and professional athletes. Professional athletes consider that assure their needed nutrient values. Comparing risks and benefits, aspects related to performance level are highlighted. Amateur athletes face more often nutritional issues, while professional athlete have a well set up level concerning nutrition and hydration.

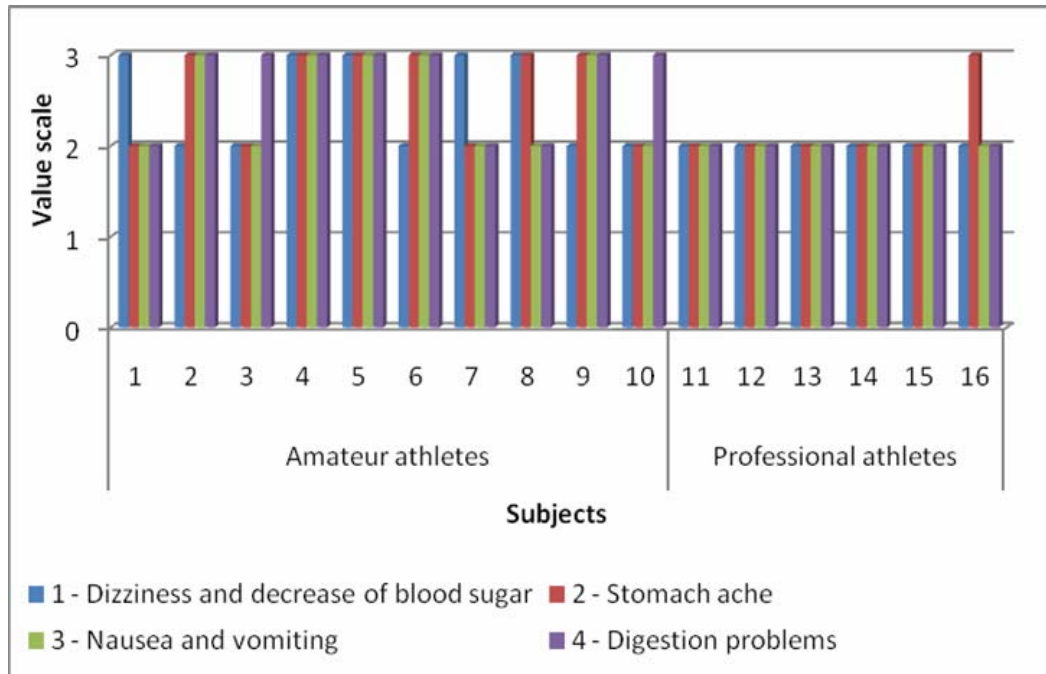


Fig. 4. *Declaratory frequency of risks felt regarding nutrition after specific efforts performed in trail running*

At question no. 3, related to psychological and social sphere from the point of view of benefits and risks of specific efforts in trail running, differences can be observed between the two groups in case of stress adjustment, where professional athletes succeed at high standard, related upside down can be found the adventure spirit.

Psychological and social benefits and risks of specific efforts in trail running, concerning stress adjustment of amateur athletes had one athlete (10%) answering to a very small extent, the rest of 9 (90%) answering to some extent. In case of professional athletes all 6 (100%)

answered to a very large extent. Concerning the need of competition all 10 (100%) amateur athletes appreciated to a very large extent and the same in case of professional athletes 6 (100%). The will and motivation was for 2 (20%) amateur athletes important to some extent, while for 8 (80%) was to a very large extent. In case of professional athletes, all of them 6 (100%) answered to a very large extent. The adventure spirit was appreciated by all 10 (100%) of the amateur athletes to a very large extent; while for the professional athletes 2 (33,33%) appreciated to some extent and 4 (66,66%) to a very large extent.



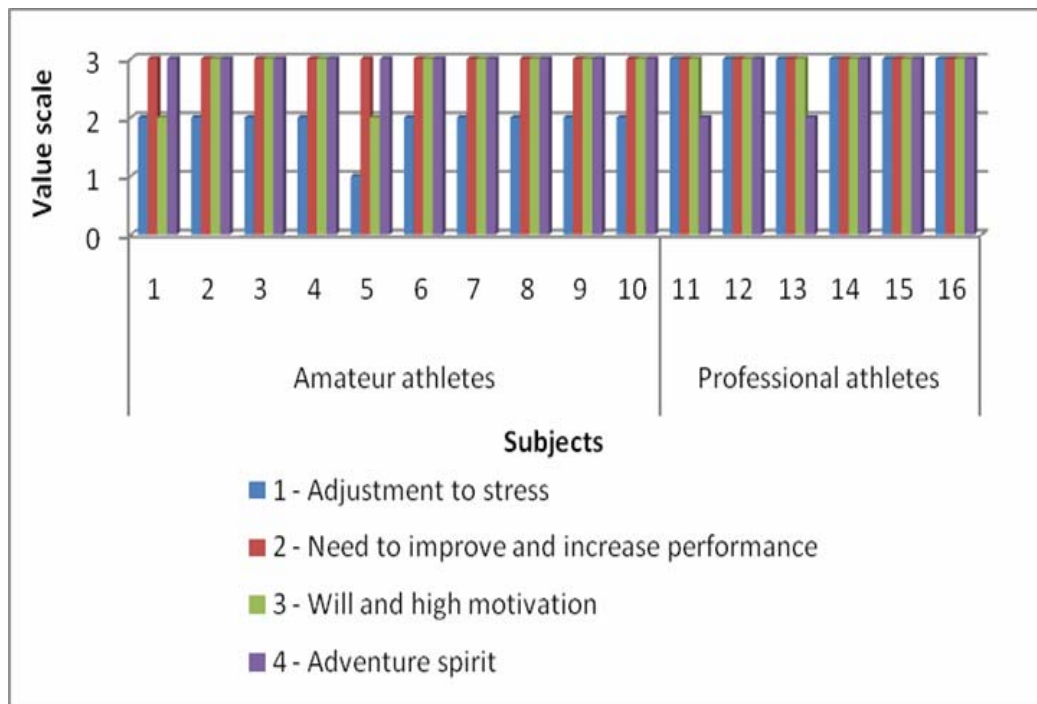


Fig. 5. Declaratory frequency of benefits felt regarding psychological and social risks after specific efforts performed in trail running

Concerning risks related to the lack of adjustment to stress at amateur 6 (60%) answered to some extent and 4 (40%) answered to a very large extent; in case of professional athletes 3 (50%) answered in a very small extent and 3 (50%) answered to some extent. Regarding dead point, frustration and helplessness, from all the amateur athletes 4 (40%) answered to some extent and 6 (60%) answered to a very large extent; while in case of professional athletes all 6 (100%) answered to some extent. Fear of losing was appreciated by the amateur athletes as follows: 6 (60%) to some extent and the

rest of 4 (40%) answered to a very large extent. In case of professional athletes 3 (50%) answered to a very small extent and 3 (50%) to some extent. The states of distrust were appreciated by 6 (60%) of the amateur athletes to some extent and by 4 (40%) of amateur athletes to a very large extent; while in case of professional athletes 4 (66,66%) answered to a very small extent and 2 (33,33%) to some extent.

Psychological wear caused by interior feelings is surprised in case of amateur athletes at a high level due to the lack of training and specific experience.

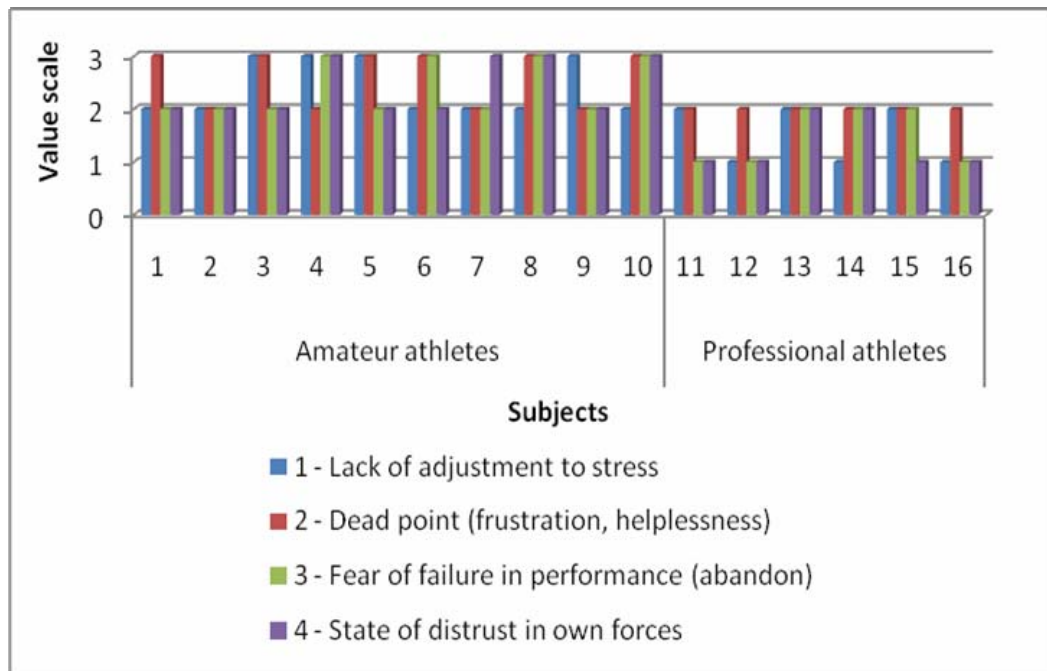


Fig. 6. Declaratory frequency of risks felt regarding psychological and social risks after specific efforts performed in trail running

Concerning ergofiziology regarding respiratory system, question no. 4 approaches benefits and risks in the specific effort practiced in trail running. So, concerning the adjustment of respiratory rhythm in case of amateur athletes, only one (10%) answered to a small extent, the rest of 9 (90%) answered to some extent; while from the professional athletes one (16,66%) answered to some extent and 5 (83,33%) to a very large extent. Regarding superior adjustments of ventilation limits in case of amateur athletes 8 (80%) answered to some extent,

2 (20%) answered to a very large extent; while in case of professional athletes (16,66%) answered to some extent and 5 (83,33%) to a very large extent. Related to the increase in pulmonary volume, all 10 (100%) amateur athletes answered to some extent, in case of professional athletes, all 6 (100%) answered to a very large extent. Positive influence of performance was appreciated by all 10(100%) of amateur athletes to some extent; while in case of professional athletes 10 (100%) appreciated to a very large extent.

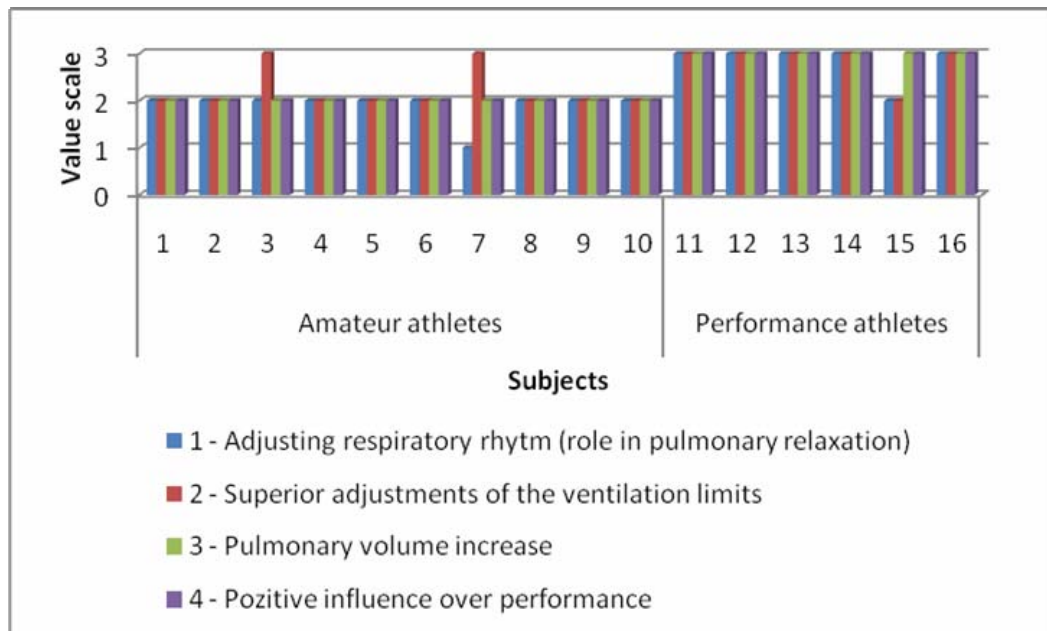


Fig.7. *Declaratory frequency of benefits felt regarding respiratory system after specific efforts performed in trail running*

Concerning risks related to difficulties in adjusting respiratory system at amateur athletes only one (10%) answered to some extent, 9 (90%) athletes to a very large extent; while in case of professional athletes all 6 (100%) answered to a very large extent. Concerning the difficulty in respiration, from all the amateur athletes 4 (40%) answered to some extent and 6 (60%) answered to a very large extent; while in case of professional athletes (66,66%) answered to a very small extent and 2 (33,33%) to some extent. The decreased pulmonary level was appreciated by 5 (50%) from the amateur athletes to some extent and 5 (50%) answered to a very large extent; while in case of professional athletes 4 (66,66%) answered

to a very small extent and 2 (33,33%) to some extent. Affecting the level of performance capacity was appreciated by the amateur athletes as follows: 5 (50%) to some extent and 5 (50%) to a very large extent. In case of professional athletes all 6 (100%) answered to a very large extent.

Concerning respiratory system, performance athletes have a superior adjustment capacity of the respiratory functions due to the specific training sessions performed systematically. In case of amateur athletes, the decreased level of capacities remembered as benefits, favorize major imbalances at the respiratory system, affecting the performance level through limiting and oscillating  $O_2$ .

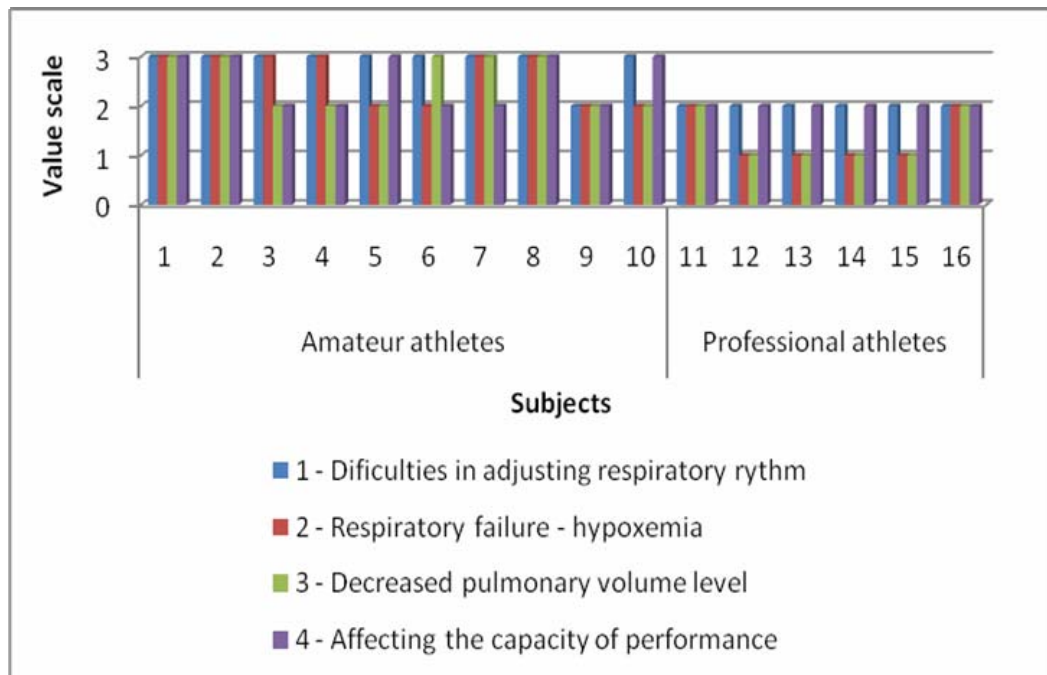


Fig. 8. *Declaratory frequency of risks felt regarding respiratory system after specific efforts performed in trail running*

At question no. 5, related to benefits and risks concerning environmental factors involved in specific effort when performing trail running, 4 (40%) amateur athletes answered to some extent and the rest of 6 (60%) amateur athletes to a very large extent; while in case of professional athletes all 6 (100%) answered to a very large extent. Concerning acclimatization 5 (50%) from the amateur athletes answered to some extent and 5 (50%) answered to a very large extent; while professional

athletes answered all 6 (100%) to a very large extent. Regarding flow effect all 10 (100%) amateur athletes answered to a very large extent; while in case of professional athletes 4 (66%) answered to some extent and 2 (33,33%) to a very large extent. Socialization was appreciated by all 10 (100%) of amateur athletes to a very large extent; while in case of professional athletes 4 (66%) answered to some extent and 2 (33,33%) to a very large extent.

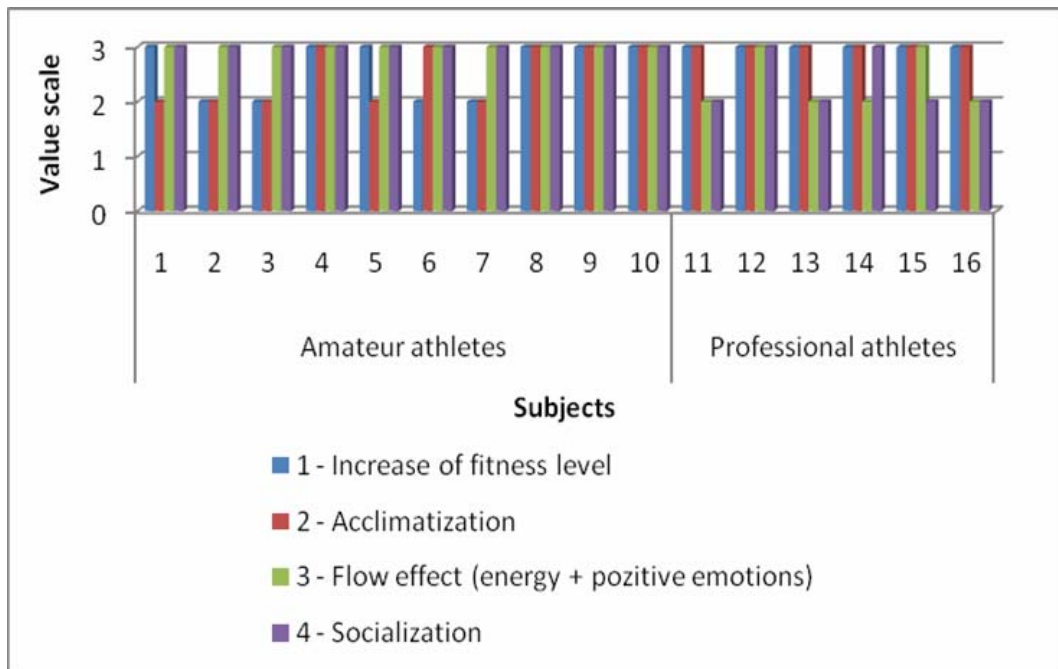


Fig. 9. *Declaratory frequency of benefits felt regarding environmental factors involved in the specific efforts performed in trail running*

Concerning risks related to injuries caused by irregular running surfaces, from amateur athletes one (10%) answered to some extent, 9 (90%) athletes to a very large extent; while in case of professional athletes 4 (66,66%) answered to some extent and 2 (33,33%) to a very large extent. Regarding insolation, from all amateur athletes 4 (40%) answered to some extent and 6 (60%) answered to a very large extent; while in case of professional athletes 2 (33,33%) answered to a very small extent and 4 (66,66%) to some extent. Deviations from the route were appreciated by 3 (30%) from amateur athletes to some extent and by 7 (70%) to a very large extent; while in case of performance athletes only one (16,66%) answered to a very small extent and the rest of 5 (83,33%) answering to some

extent. Meeting some dangerous animals was considered by all the amateur athletes 10 (100%) important to some extent and from the professional athletes 5 (83,33%) answered to some extent and only one (16,66%) answered to a very large extent.

Experience in trail running makes the difference between the two groups concerning deviation from the route, answered to a large extent.

From the question above it can be summarized that amateur athletes are superior to professional athletes concerning flow effect and socialization, while the elite has a high level in case of acclimatization process due to repetitive training at altitude, insulations due to inadequate equipment and in case of accidents caused by irregular running surfaces.

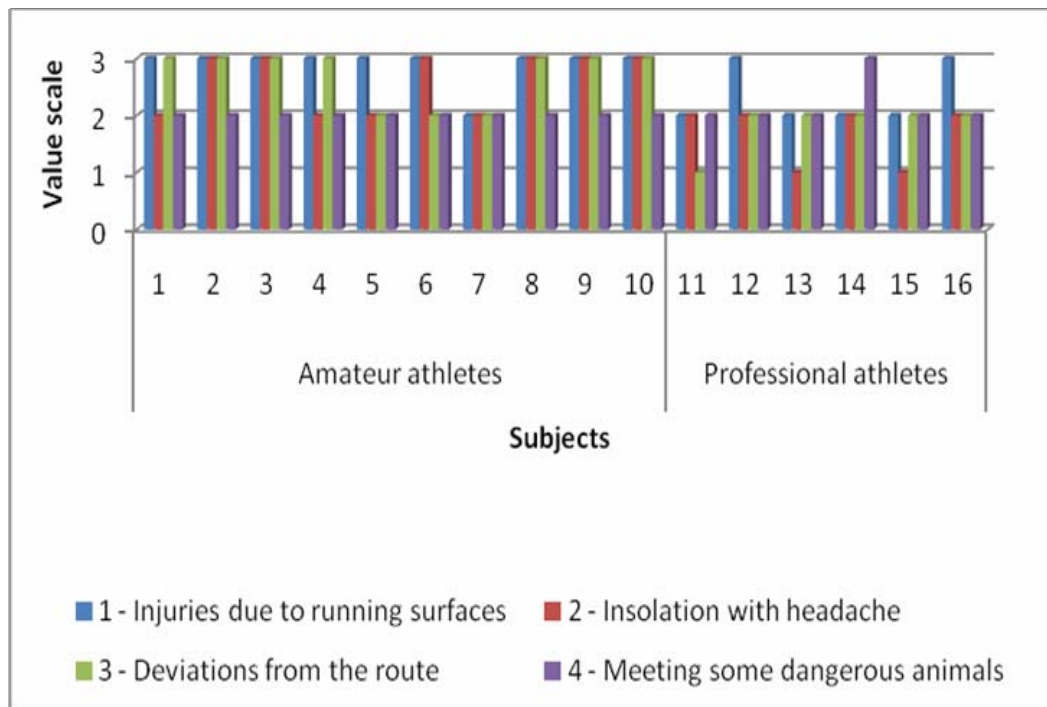


Fig. 10. Declaratory frequency of risks felt regarding environmental factors involved in the specific efforts performed in trail running

Another approach of the current theme in research was the realisation of an interview with two federal coaches who have an important role in teaching, practicing and organizing the activity of trail running in Romania. The interview had questions related to states and sensations felt by questioned athletes, so I approached factors and specific components for this type of effort. The topic includes questions about energetic resources, nutrition, hydration, psychological aspect, technical and tactical aspects, adjustment of the muscular system, respiratory system, circulatory system and material resources. Questionnaires had informative values towards the feeling and sensation that occur into athletes careers for coaches.

#### 4. Results

According to the accumulated running experience level and the capacity of adaptation and the capacity of avoiding risks caused by perturbarory factors, premises for avoiding injury risks are realised [8]. The way of approaching training or competition efforts represent either a risk, or a beneficial factor according to experience and depending on the case [1].

#### 5. Conclusions

As an important benefit, the adjustment process to the specific effort demands transformations and adjustments to repetitive stimulus of endocrine and metabolic system, respiratory system, circulatory system, neuromioartrokinetic

system. The constitution of the performers is a deciding component in the length of the athletic career and it is highly related with injuries (traumas, muscle problems, instability and ligamentar hiperlaxity). Repeating these efforts also stimulate modifications at the capacity of fitness level. The lack in managing in an economical mode, efficient to effort affects muscular oxygenation, producing muscle fatigue.

The lack of adjustment to altitude could cause insomnia, thorax pain, nausea, vomiting, deshydration, limiting adjustment of VO<sub>2</sub> max. Economy in effort after sistematic training realised at altitude, demands aclimatization for the body of the athletes, realising a 'natural and legal blood doping' method.

A good model of preparation should include note only ways of prevention and control towards the risks discussed above, but also means of taking advantage of any benefit.

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