# EUROPEAN Journal of Physical Education and Sport

Has been issued since 2013.
ISSN 2310-0133. E-ISSN 2310-3434
2015. Vol.(10). Is. 4. Issued 4 times a year





The journal is registered by Federal Service for Supervision of Mass Media, Communications and Protection of Cultural Heritage (Russia). Registration Certificate **ПИ № ФС 77 – 55400** 17.09.2013.

Journal is indexed by: **CrossRef** (UK), **EBSCOhost Electronic Jornals Service** (USA), **Electronic scientific library** (Russia), **Global Impact Factor** (Australia), Open Academic Journals Index (Russia), **ULRICH's WEB** (USA).


All manuscripts are peer reviewed by experts in the respective field. Authors of the manuscripts bear responsibility for their content, credibility and reliability.
Editorial board doesn't expect the manuscripts' authors to always agree with its opinion.


Postal Address: 26/2 Konstitutcii, Office 6
354000 Sochi, Russian Federation

Website: http://ejournal7.com/
E-mail: ejm2013@mail.ru

Founder and Editor: Academic Publishing House *Researcher*

Passed for printing 16.12.15.

Headset Georgia.
Ych. Izd. l. 4,5. Ysl. pech. l. 4,2.

Order № 10.





European Journal of Physical Education and Sport

2015

№ 4

Европейский журнал физической культуры и спорта

2015

№ 4

# Европейский журнал физической культуры и спорта

Издается с 2013 г. ISSN 2310-0133. E-ISSN 2310-3434
2015. № 10 (4). Выходит 4 раза в год.



Журнал зарегистрирован Федеральной службой по надзору в сфере массовых коммуникаций, связи и охраны культурного наследия (Российская Федерация). Свидетельство о регистрации средства массовой информации **ПИ № ФС 77 – 55400** 17.09.2013.

Журнал индексируется в: **CrossRef** (Великобритания), **EBSCOhost Electronic Jornals Service** (США), **Global Impact Factor** (Австралия), **Научная электронная библиотека** (Россия), Open Academic Journals Index (Россия), **ULRICH's WEB** (США).



Адрес редакции: 354000, Российская Федерация, г. Сочи, ул. Конституции, д. 26/2, оф. 6
Сайт журнала: http://ejournal7.com/
E-mail: ejm2013@mail.ru

Учредитель и издатель: ООО «Научный издательский дом "Исследователь"» - Academic Publishing House *Researcher*

Подписано в печать 16.12.15.
Формат 21 × 29,7/4.

Гарнитура Georgia.
Уч.-изд. л. 4,5. Усл. печ. л. 4,2.
Заказ № 10.

C O N T E N T S

**Articles and Statements**

Published in the Russian Federation
European Journal of Physical Education and Sport
Has been issued since 2013.
ISSN: 2310-0133
E-ISSN: 2310-3434
Vol. 10, Is. 4, pp. 167-171, 2015

DOI: 10.13187/ejpe.2015.10.167
www.ejournal7.com


**Articles and Statements**

# Study of the Determinants of the Sports Performance in Football

[1] A. Benchehida
[2] H. Bessikadour
[3] M. Sebbane

[1] Laboratory for Optimising Research Programmes on Physical and Sports Activities, Algéria
[2-3] Laboratory Research Applied Sciences in Human Movement (LABSAMH),
Institute of Physical Education and Sports- Abdelhamid Ibn Badis University,
Mostaganem, Algéria

**Abstract**

It is important to find the most reliable method possible which will draw on criteria and scientific standards to increase the chances of champions by generalizing the testing on a larger number of individuals and selecting that young people have a chance of succeeding. The lack of certainty in all what is being done on the detection and selection shown was how it is difficult to conduct well was the work of sports talent identification. To conduct this study, we chose to study of essential data, namely .the skills ' sample is composed of 21 coaches, having a great experience, at which on a request to assess skills required in football and their degree of solicitation. The analysis of the results show that (expert) coaches have estimated that among the 13 skills studied, five from among them emergent and get a certain unanimity and for which there is agreement .Skills required for the practice of football in order of importance are endurance cardio respiratory, the explosive force of the lower members, the dynamic force of the lower members, speed and the strength of the trunk. Experts have withdrawn the other ruled less specific to football. And for the preparation of tests simplified and affordable we have selected three skills that we judges consistent with the categories of ages studied.

**Keywords:** determinants, performance, experts.

## Introduction

We assume that to achieve certain results at a high level, it is imperative for the footballer to possess the essential qualifications required by the high-level football and identified by the experts. To follow a scientific procedure we held account of the work of Cazorla, g. (2006) relative has ' *the expertise of the physical and physiological high-level football requirements "which* took the approach, the analysis of the requirements of the practice of high-level football according to:

* Expert technicians
* Data
* Comments
* Literature

**Issues and assumptions**

The issue, we are interested in our study, to this aspect, in the matter of the morphological, physical, and physiological variables that differentiate individuals between them about what differentiates the champions of other normal individuals: the Human Motricity. Durand (1987) following Crombach (1965), studied this aspect at two angles: "the first requests the process implemented in the activity. II focuses on the operation of the subject and it falls within the General Psychology,""• the second relies on the differences between individuals in achieving tasks. It highlights the characteristics stable and personal subjects. It is the differential psychology. "And we'll call skills. And we asked, what are the physical criteria required in football that determine the choice of a player, and most is - it possible to detect the possibilities of success from the very beginning of his career in a young? Finally, whether physical skills are key determinants to select a footballer. We have made certain assumptions that we will try to confirm in this study: *therefore, we start from the principle that to achieve certain results at a high level, it is imperative for the footballer to possess the essential qualifications required by the high-level football and defined by experts*. On the other hand, and corroborating the results of previous research "the prediction of performance from the early results, at this level is very difficult." Famose, J.P. (1988). It is possible "with risk appropriate errors if the prognosis is based on a performance in a close age of maturity athlete." it is certain that "all sporting disciplines do not have the same physical requirements" Leveque. N. (2005) and that each sport has its own specificities of detection and selection criteria; Thus the criteria (skills) more required in football are those, mention in the literature and determined by experts.

**Physical and morphological variables**

***The physical abilities***

The choice of the concept 'skills' in our work is linked to the theme and it perfectly conveys the meaning, that is to say it is what differentiates individuals between them and we want to give to this research. 'Skills *are the cornerstone of the theory of Fleishman»* Famose, J.P. (1988). Thus every individual engaged in a task will mobilize its own abilities (abilities, qualities) to achieve its goals. It turns out to be necessary to introduce some clarifications on the meaning gives to the various concepts that are: skills, abilities, skills, morphology, determinants etc. The term 'suitability' is the most important concept of our theme; we will explore it more extensively in this chapter. In its work on the development of skills and motor skills, Neagu, N., (2010) defines skills as "the traits, respectively (strictly individual) relatively stable natural, psychic and physical predispositions that give the individual the ability to perform a certain Act, with a minimum of effort, but at higher settings, in comparison with other individuals in the same age category and training. " We can also say that 'motor skills - the speed, the strength, coordination, strength and mobility - are part of the individual genetic predispositions, as they are assessed by methods and specific procedures, which can be quantified and whose individual results can be reported to the standard contextual grids." Neagu, N. (2010) *Le Petit Robert* gives us the ability the following definition: "Natural disposition to...". "This 'natural' qualifier already promises an idea of staff, innate, and this can result in our opinion by a physical or physiological characteristic or a trait of character. So the coaching occurs that may or not at all in this capacity. In the *Encyclopaedia Universalis*, Reuchlin envisages the concept of fitness under three lights:

***Morphology***

An individual, in addition to his physical appearance, has a soul and a body that differentiates someone else is his Anatomy or morphology. Admitted in sporting activity that the size of an athlete gives it a clear advantage over its competitors and some authors as Brikci, and Dekkar, (1987) noted the influence of different morphological factors on achieving high results in race walking. The authors showed that the sporting result increases compared with the increase of the size of the body surface of absolute and relative to the age of the athlete, to the circumference of the thigh and the fat component. In the jumping, segmental body dimensions contribute to obtain the best performance, Genov, (1953). He argues that the length of the break depends on the length of the arm (r = 0.53) to the diameter of the arm (r = 0.44) and the length of the leg (r = 0.43). In the throws, MD (1986) shows the influence of the size and the weight of the body of the launchers on the performance. In handball, the importance of the large size was disclosed by Brikci

and Dekkar (1986) (day of the 1986 sport physician). The authors note that with the increase in size, the lever expands ensuring a greater than the firing efficiency purpose. Handball in the penalty shootout, have the index weight - height higher than the other players. The detection of the Federation, the size and the span criteria are so well chosen to characterize the handball players of high level. The morphological profile of the handball is summed up well by the size and the span of the supporting hand of the ball, the other measurements providing only low additional relevant information with the handball. This justifies *a posteriori* the choice of the criteria of the French Handball Federation during the stages of detection. In a dedicated study a overweight and its influence on physical development and its effects on motor performance, Mr. Ammar & al. Note that anthropometric appearance or morphological component condition to a large extent the driving conduct. In addition, the increase in the degree of overweight leads to selective changes most pronounced at the level of certain qualities motrices.par elsewhere, variations and the stride length are not strongly influenced by size and reports levers Weinek, (1996.) of other researchers, "confirmed these results, they reported that factors such as the size and weight can be specific anthropometric has a post gives without so far intervening on the performance in sprint capacity. Thus, the case is linked directly a discipline sports Gill et al. (2007)

**Assessment of skills**

In his study on "prognosis of high levels of fitness in complex tasks" Fleishman has identified about 50 human skills divided into four main groups: physical, psychomotor, perceptual, and cognitive. They are classified into 13 physical abilities, 17 psychomotor and cognitive skills and 20 intellectual. To make its easy usage model, Fleishman "had styling each of these skills so that the name corresponds to the nature of the task. II thus gives a very precise definition of the reporting ability. » Among the human skills listed by Fleishman and Quaintance (1984), and that we have higher status, a first sort is already done. Shall be kept only those that we considered, empirically, required for the football discipline based on types of motor actions of the player. This method can be used on condition that the knowledge of the discipline is total. And it is from the sources in the literature that we have with the collaboration of experts (teachers, educators, coaches, football who participated has this choice) developed a list of driving ability.

**Methodology**

Among the fifty human skills listed by Fleishman and Quaintance (1984), and that we have higher status, a first sort is already done. Only 13 motor skills are retained. This method can be used provided that the competence of providers is recognized; hence a duty to appeal has experts and data from the literature. Then, determine if the answers from experts are consistent (identical or close) to the results of work and scientific research, mentioned in the literature. The method is to present a picture (paper, and internet) with a precise definition and a "how-to" forty experts with professional experience and a high level of expertise in the field of training and football, (teachers and trainers). Only twenty and one questionnaires could be used. It is then for them to evaluate whether each proposal is required or not for the practice of high-level football, and if required, indicate its level of solicitation.

**Results**

***List of motor skills***

1. Dynamic force of the upper limbs 2. Cardio-respiratory endurance 3. Dynamic flexibility 4. Overall coordination of the body 5. Strength of the trunk 6. Explosive force of the lower limbs 7. Dynamic force of the lower limbs 8. Static flexibility 9. Evaluation of speed 10. Explosive force of upper limb 11. Balance body general 12. Static strength of limb 13. Static force of lower limb

***Classification of motor skills***

*The analysis of the collected data, allows us to classify different skills after the marks given by the experts.*

| | SKILLS | Total | AVG. | EC | Min | Max |
|---|---|---|---|---|---|---|
| 1 | RCT | 137 | 6.52 | 0.51 | 6 | 7 |
| 2 | FEMI | 133 | 6.33 | 0.65 | 5 | 7 |
| 3 | FDMI | 127 | 6.04 | 1.07 | 4 | 7 |
| 4 | EV | 121 | 5.76 | 1.30 | 3 | 7 |
| 5 | FT | 114 | 5.42 | 1.24 | 3 | 7 |
| 6 | SD | 108 | 5.14 | 1.10 | 3 | 7 |
| 7 | RAMS | 93 | 4.42 | 1: 16 | 2 | 7 |
| 8 | GSC | 90 | 4, 28 | 1: 27 | 4 | 7 |
| 9 | SS | 68 | 3, 23 | 2, 02 | 0 | 6 |
| 10 | FEMS | 67 | 3: 19 | 1, 56 | 0 | 6 |
| 11 | ECG | 57 | 2, 71 | 1, 34 | 0 | 4 |
| 12 | FSMI | 53 | 2, 52 | 1, 63 | 0 | 5 |
| 13 | FSMS | 52 | 2.47 | 1, 95 | 0 | 4 |

Table 1: classification of motor skills

3. Motor skills required for football

| NO. | SKILLS | Total | AVG. | EC | Min | Max |
|---|---|---|---|---|---|---|
| 1 | RCT | 137 | 6.52 | 0.51 | 6 | 7 |
| 2 | FEMI | 133 | 6.33 | 0.65 | 5 | 7 |
| 3 | FDMI | 127 | 6.04 | 1.07 | 4 | 7 |
| 4 | EV | 121 | 5.76 | 1.30 | 3 | 7 |
| 5 | FT | 114 | 5.42 | 1.24 | 3 | 7 |

Table 2: motor skills required for football

**Discussion**

The average of the points obtained by each ability was calculated as deviation thus measuring the index of dispersion of the responses, a driving skills required for football profile has been achieved, (those who have obtained a greater than or equal average 5.00 on estimation scale.) The opinions are quite consistent since the concept of cardio-respiratory endurance totals 137 points, 6.52 average and the standard deviation is 0.51. Technicians assessed the level required by the explosive force of members below to the second most important (6.33 on the scale from 1 to 7). With a small deviation of 0.67, it appears to be *a priori* more required for football. The dynamic force of the lower limbs was ranked in third place on the list of required motor skills. The value obtained is 6.04 for a total of 127points and standard deviation 1.07. The definition of this ability proposed fact coaches refers to the concept of muscular endurance and highlights the resistance to fatigue of the muscles at the level of the feet and legs. The speed of movement of the members was considered to be required in football with 5. 76 medium on the scale of solicitation the level required by the strength of the trunk was estimated to 114 points for an average of 5.42 per the specialists consulted. The standard deviation is 1, 24 there is no consensus, and the notes range from a 3, 7 regarding the solicitation.

**Conclusion**

We know that "has every sport match specific morphological characters related to the nature of the latter, ' and that all data collected were interesting, but should be defined more accurately each ability and what it proved to be useful to determine predispositions of the young player for the practice of football. If the measured physical abilities are conditions of validity and consistency in a meaningful way they could contribute to the prediction of performance and allow detection and a satisfactory selection. Therefore, these predispositions allowed the player to be good physically to be then technically. And in this sense, the results of the evaluation of motor skills necessary for the practice of football and their degree of solicitation by experts, gave encouraging results: -cardio-respiratory endurance, as ability greatly contributing to performance. Focusing on the maximum over an extended period of effort and resistance to tired - the dynamic force of the lower limbs is useful for the footballer in his movements. The importance of this capability highlighted previously, at the level of resistance to fatigue of the muscles, feet and legs among players. The speed of limb movement was deemed required in football. In reference to the concept of frequency, associated with the amplitude of the strides that condition running on a ground speed.

-The explosive force was considered very important by the technicians who consider this essential skill for the player in starts and changes of pace and direction.

-The strength of the trunk, promotes the action of the abdominal belt (tone and endurance) at the footballer, for her role of peacekeeping but also in specific, actions the duels, body marking and in races with ball where play dribble, feints and overflows his opponent

To measure and assess various skills, we offer a series of testing in accordance with the principles of assessment and which were valid by other researchers and are commonly used in the field of sport.

**References:**

1. Ammar M. et al (2001). Influence of overweight on the Anthropometric development and motor performance.

2. Brikci. A. (1986): standard type of Algerian thrower. I.E.P.S. Algiers.

3. Brikci. A & Dekkar. N. (1987) Athletic Predictors of performance. Sports medicine, 61

4. Cazorla, G. (2006). Evaluation physical and physiological football orientation of preparing physics lab, University of Bordeaux.

5. Crombach, L.J & Glezer G.C. (1965). *Psychological tests and personnel decisions* abana, Illinois, University of Illinois press.

6. Famose, J.P. (1988). Name and definition operational skills.

7. Famose, J.P. (1990). Motor learning and difficulty of the task. 167 Paris: INSEP

8. Fleishmanne. H & release Mr. K. -Taxonomies of Human performance. New York Academic Press, 1984.

9. Gill, D.L. Ruder, M.K. & Gross, J.B. (1982). Open-en ed. Responsibilities in team competition. Journal of Sport Psychology, 4-2, 159-169.

10. Lévêque, M. (2005). *Psychology of coaching or training of sportsmen art*. Paris: Vuibert.

11. Neagu, N. (2010). The training and development of skills and motor skills at the level of performance athletics, doctoral thesis.

12.Weinek J. (1997). Training manual, new translation, Ed. Vigot, Paris, France.

Published in the Russian Federation
European Journal of Physical Education and Sport
Has been issued since 2013.
ISSN: 2310-0133
E-ISSN: 2310-3434
Vol. 10, Is. 4, pp. 172-180, 2015

DOI: 10.13187/ejpe.2015.10.172
www.ejournal7.com


UDC 615.825.1

# Introducing Paneurhythmy – Group Exercises, Music, Poetry, Geometry and Nature Combined in Favor of Health

[1] Ludmila K. Chervencova
[2] Nikolay N. Ishev

[1] „Vassil Levski" National Sports Academy, Sofia, Bulgaria
Department of Physical Therapy and Rehabilitation, Chief assistant professor, PT, PhD
[2] PT, BC
E-mail: l.chervenkova@gmail.com

**Abstract**

A growing number of scientific publications and researches explore practices with global impact on human health. As a relatively new mind-body practice Paneurhythmy is the least known and least studied in comparison with similar activities like Yoga and Tai Chi. Paneurhythmy is a universal physical practice that can unite people regardless of their race, gender, age, nationality and religion. It is a unique system of gymnastic musical exercises performed outdoors as a group activity. Paneurhythmy was created between 1922 and 1944 in Bulgaria by Petar Danov (1864-1944). Paneurhythmy has a profound philosophical meaning and combines harmoniously music, movement, thought and word. The participants maintain an upright and well-balanced posture, while moving in a circle. Each of the Paneurhythmy exercises reveals a basic philosophical idea expressed through its name, movements, music and the lyrics of its song. The Paneurhythmy movements are smooth and follow the musical beats, which are running rhythmically in a slow to moderate pace. This article discusses the visions of the author of Paneurhythmy for its purpose and effect, it also gives the main components of Paneurhythmy and presents some of the studies on it. Paneurhythmy exercises are easy to be done regardless of the age, financial condition and physical characteristics of the practitioners. Paneurhythmy is a pleasant and very effective method to put into action the ancient maxim "A healthy mind in a healthy body".

**Keywords:** outdoor exercise, mind-body practice, balance, mental health, Bulgarian.

## Introduction

The interest in leisure time physical activities affecting all aspects of human health – physical, mental and social – has increased significantly over the last few decades. Many physical practices with philosophical and spiritual elements are being performed in places, which are far away from their origin.

Many exercises and activities have a complex positive impact on the physical health as well as on the emotional and mental state and even on the social welfare of the practitioners. The international scientific community nowadays is in a search for and in a study of such psychophysical activities, realizing their great potential and benefits. This is proven by the growing number of scientific publications and researches about such practices with global impact on human

health. The detailed studying of activities like Yoga, dancing, Paneurhythmy, Tai Chi and other eastern martial arts provides an opportunity to assess in detail and make full use of their maximum potential impact by identifying their specific advantages and disadvantages associated with a certain health condition, age or other social parameters. As a relatively new mind-body practice Paneurhythmy is the least known and least studied of the above mentioned activities.

**What is Paneurhythmy**

Paneurhythmy is a universal physical and mental practice that can unite people regardless of their race, gender, age, nationality and religion. It is a unique Bulgarian system of gymnastic musical exercises performed in a group (all participants are arranged in pairs forming a circle). Paneurhythmy exercises are performed in the morning in nature - from March 22 to September 22 [1]. Paneurhythmy resembles a dance and has a complex beneficial impact on both physical and mental well-being of its practioners. It can be compared to such activities as Tai Chi, Yoga and other eastern practices. It has a profound philosophical meaning and combines harmoniously music, movement, thought and word [2].

Each Paneurhythmy exercise has its own music composed by the author, which is clearly related to the movements and key messages of the exercise. The participants maintain an upright and well- balanced posture, while moving in a circle, always going in the counterclockwise direction. The musicians and/or singers are in the center. The Paneurhythmy movements are smooth and follow the musical beats running rhythmically in a slow to moderate pace [1,3].

Etymologically, „Paneurhythmy“ is derived from three roots: „pan“ – meaning whole, universal and cosmic, „eu“ – meaning true or supreme, the essential and substantial in the world, and „rhythmy“ – meaning correctness in the movements and every other external expression in life. The prefix pan denotes that this is an expression of the rhythm presented in the entire Nature and underlying the entire creation. According to this etymological derivation, „Paneurhythmy“ can be translated as Supreme Cosmic Rhythm [1,3].

Paneurhythmy was established in the first half of the 20th century in Bulgaria. Its creator, Petar Danov (1864-1944), also known as Beinsa Duno, is the founder of a spiritual community which he has led for more than 22 years [2]. His works consist of approximately 4,000 lectures, published in more than 250 volumes [4]; musical compositions, most of which were written with the lirycs; articles; letters and Paneurhythmy [2]. In 2015 Bachev defines the teaching of P. Danov as “representing the meeting between: man and the source of life, wisdom and intellect, East and West, prophetic and philosophical, culture and nature" [5].

For less than a century Paneurhythmy has attracted the attention of people from different cultures and nationalities. This was happening despite the 40-year totalitarian regime in Bulgaria, when teaching and practicing such practices was forbidden. Nowadays the interest in Paneurhythmy is growing even faster and it is being spread all around the world [2].

Each of the Paneurhythmy exercises reveals a basic philosophical idea expressed through its name, movements, music and the lyrics of its song [1,2]. P. Danov explains that every movement should be studied and performed in a conscious way. Each of the movements is related to a musical form. Each of the musical forms is related to a certain mental activity [6]. The sequence of the Paneurhythmy exercises is related to the continuous process of development of both the individual and collective consciousness of the human being [7,8,9].

**Key features of Paneurhythmy as a complex of exercises**

Paneurhythmy consists of three parts: Part 1 - “28 exercises”; Part 2 - “Sunrays”; Part 3 - “Pentagram”. Each part has its own characteristics, unique exercises, music arrangement and duration. Paneurhythmy exercises are aerobic and not competitive [1,3,7]. The movements are cyclic, rhythmic, within the physiological range of motion, Some exercises are simple, while others are more complex. The gait is characterized by contacting the ground first with the toes and balls of the feet, then with the heels. All these features help improving the locomotion, by straightening the muscles and maintaining a normal range of motion in the joints [2].

The duration of the performance, including the pauses between the exercises, is generally between 70 and 75 minutes (it could be longer in larger groups). Not counting the pauses, it takes approximately 60 minutes (1 hour) [10].

Paneurhythmy is always performed at a slow to moderate pace. The exercise intensity depends on the participants' health and physical fitness. It is expected to be low to moderate for athletic individuals and people in good health, and from moderate to high for elderly people, sedentary individuals or individuals with health problems leading to some limitations in their physical activity. The next Table shows the main components of Paneurhythmy.

Main components of Paneurhythmy

| Component | How it is presented in Paneurhythmy |
|---|---|
| Movement | A variety of weight-bearing exercises, performed in an upright position for 60 min. (without the pauses between the exercises). The movements are smooth, rhythmic, synchronized with the music, at a slow to moderate pace. Most of the time the participants are forming a circle together. |
| Music | The 30 musical compositions were especially created for Paneurhythmy, also synchronizing the participants' movements.<br>The music can be performed instrumentally and/or vocally.<br>The musicians and singers are located in the center of the circle formed by the participants. |
| Poetry | The musical compositions have their own poetic lyrics, which form the Paneurhythmy songs. They can be sung by a singer/choir staying in the center of the Paneurhythmy circle and/or can be quietly sung by the participants. This lyrics reveals a world, in which one is surrounded by light, nature, beauty and music [11]. |
| Nature | Paneurhythmy is performed outdoors. The participants interact with the Sun, air, wind, with the different landscapes, sounds and smells of Nature. |
| Geometry | The participants perform the exercises together in a circle (first arranged in pairs and then in groups of 12 and 10). They move their upper and lower limbs in straight and curved lines, reaching certain angles. During the whole process they should form different geometrical figures (squares, circles, straight lines, radii, pentagrams). |
| Ideas and Philosophy | Each Paneurhythmy exercise has a profound spiritual meaning and symbolizes a sublime idea implied in its name (awakening, giving, reconciliation, ascending, liberation, etc.). The arrangement of the participants and the directions of their movements have also a symbolic meaning. Each part of the Paneurhythmy represents a story about the human path toward enlightenment. |

**Petar Danov's concepts about Paneurhythmy and health**

The topic of health and its importance in life is one of the main themes in the rich spiritual and cultural heritage left by P. Danov. It is focused on examining the different aspects of health, causes of diseases and various approaches to their treatment. P. Danov recommended many practical methods for achieving and maintaining good health through a healthy lifestyle, including body hygiene, work hygiene, hygiene of thoughts and feelings, proper nutrition, etc. Back in 1917, Danov stated that doctors needed to broaden their understanding of hygiene and began to deal also with mental hygiene in addition to body hygiene [12]. He also pointed out the importance of other health factors such as sufficient and appropriate physical activity, optimal use of sunlight, water and air, etc. His views on the close connection between mental and physical health, between humankind and nature were quite innovative and impressive. According to Sv. Baltova, P. Danov has given in his teaching "the key concepts of the holistic worldview about the human being and health as a whole laying down the foundations of the holistic medicine in Bulgaria" [13].

In the first published book about Paneurythmy [1], the practice was primarily defined as a method for maintaining good health and for healing through the rhythmic and harmonic movements, combined with corresponding music, concentration of thought and correct breathing.

According to P. Danov Paneurhythmy exercises have an overall effect on one's physical condition and health. Being many and diverse in nature, they engage most of the muscles and joints of the human body. They are also designed to nourish and strengthen the nervous system, improve the emotional and mental health and stimulate the development of one's virtues and

talents [1]. During the exercises the one's mind should be concentrated on the movements and the sublime ideas, which they represent. Performing Paneurhythmy in vigilant awareness, with focused thought/attention, emotion and will intent may bring every and all participants into the state of harmony and unity [9].

P. Danov considers that Paneurhythmy movements "are being transformed into internal mental processes". They have a "major impact on the human consciousness" and can be used as a "method of self-development" [9, 14]. He points out that there is a cosmic rhythm "inwrought" in Nature (in the macro and microcosmos, including the movements of electrons in an atom) and that is why the rhythmic movements are so beneficial [1]. He states that the impact of a musical composition or a physical movement depends on its harmony and resemblance with this cosmic rhythm [9] and that all elements in Paneurhythmy satisfy these characteristics [1]. Modern researches in the field of chronobiology also state that "rhythm is an essential requirement, basis and regulator of life" [15].

P. Danov defines Paneurhythmy as a practice of high productivity and low energy consumption. "Paneurhythmy contains really efficient movements; not being complicated but easy and pleasant to be done, they lead to excellent results" [9].

**Evidence of the therapeutic potential of Paneurhythmy**

We are going to make a brief review of some of the researches about the effects of Paneurythmy exercises.

A preliminary survey [16] on 140 individuals of age from 19 to 80 (mean age 46,9; 72,1% women) who have been practicing Paneurhythmy for different time: from 1 month to 65 years (average 6,9 years) was published in 2004 (Chervencova, 2004). 81.4% of the respondents have started practicing Paneurhythmy during the last 10 years before the timeframe of the survey. Only two of them (1.4%) reported about observed undesirable effects of the exercises like worsening relationships with people (0.7%) and unwanted weight gain (0.7%). The majority of the respondents indicated an improvement in the mental, physical and social aspects of their health. Most of them had observed: improvements in their social relationships (83,6%), increased concentration of attention (75%), increased self-confidence (75%), increased vitality (75%), more optimism (73,6%) improved gait (71,4%), improvements in motive characteristics (68,6%), posture (67,9%), physical endurance (65,7%), connectedness with Nature (65,7%), and improvement of their lifestyle (63,6%). The most frequently mentioned change is the stronger desire for a healthier lifestyle. A smaller percentage of the respondents also indicated: improvements in sleep (42,8%), increased physical strength (38,6%), positive influence on some diseases (35%), body weight regulation (21,1%), and reduced pain symptoms (20%).

A controlled study [17] on adults indicated a significant improvement in the quality of life due to the health improvement (as measured by the SF-36 Health Survey) coming as a result of the initial 6 month training of Paneurhythmy. The positive changes were observed in both the physical and mental component of health [17].

A controlled study on adults [2] established that a 5-6 month training of Paneurhythmy significantly increased the resistance of the participants to psychological stress. For objectification of the changes the following three questionnaires in the Bulgarian language adaptation were applied: Perceived Stress Scale (PSS) by Cohen, Kamarck, Mermelstein (1983); Ego Resiliency Scale (ER-89) by Block & Kremen, (Block & Kremen 1996); Sense of coherence (SOC) measured by Antonovsky, (1979, 1987) [2]. These tests were applied on an experimental group before and after the basic training in Paneurhythmy and with the corresponding control persons not practicing Paneurhythmy. The results showed the following significant changes from the initial 5-6 month Paneurhythmy training led by qualified teachers (2-1 times weekly, respectively): reduced Perceived Stress, increased Sense of coherence and increased Ego Resiliency. Meanwhile, in the control group there were no significant changes [2]. These are extremely important results related to the life of modern humanity. The concept of Ego Resiliency encompasses traits that emphasize flexibility and resiliency toward constantly varying situations and a general resourcefulness of personality. This is useful behaviorally: ego-resilient individuals are intelligent, resourceful and adaptive in stressful situations [18]. Individuals with a high Sense of Coherence are more resistant to the negative effects of stress and anxiety, which could otherwise result in a suppressed immunity system leaving an individual more prone to illness [19]. Therefore, even the 6-month

Paneurhythmy training for beginners, which is its incomplete and easier version, brings changes allowing people to manage stressful situations in life and stay well.

More information on Paneurhythmy research up to 2010 is presented in a lecture by Chervencova and Zsheliaskova-Koynova [23].

**Paneurhythmy for healthy aging and prevention of balance loss**

The prevention of falls and mobility-related disability among older people is an urgent public health challenge. Although many risk factors for falls have been identified, intervention trials have found that the effects of exercise as a single falls prevention intervention are comparable to those from multifaceted interventions.[20] Therefore, widespread implementation of exercise as a single intervention seems to be the best approach to falls prevention at a population level [20].

A controlled study found out that in adults both a 5-6 month (2-1 weekly sessions, respectively) training of Paneurhythmy and a 6-month (March – September) practice of Paneurhythmy had led to significant improvements in the static and dynamic balance of both the young and older practitioners (range of age18-68) [2]. The analysis of Paneurhythmy exercises shows that they poses the necessary features to improve successfully one's static and dynamic balance, because there are many Paneurhythmy exercises with a reduced base of support, with movement of the center of gravity (control of the body position, while standing and moving in an upright position) as well as exercises stressing the postural muscle groups.[2] These are recommended features of a balance exercise designed for frequent fallers or individuals with mobility problems [21, 22]. Sherrington et al. [20] recommended that falls prevention exercise had to target both the general community and those at high risk for falls. We consider that the practice of Paneurhythmy is an excellent tool for falls prevention exercise targeting both the general community and those with moderate risk of falls who are able to walk independently. For the last mentioned is advisable to start with an adapted course in basic training of Paneurhythmy in order to increase gradually the requirements for balance and endurance. Paneurhythmy can provide a moderate or high challenge to balance and can easily be undertaken as recommended at least 2 hours because it is pleasant, socializing and with powerful positive influence on psychological state [2]. That is why it will be very interesting to study the impact of Paneurhythmy on reducing the risk of falls in physically active older people.

Although no amount of physical activity can stop the biological aging process, there is an evidence that regular exercise can minimize the physiological effects of a sedentary lifestyle and can increase the active life expectancy by limiting the development and progression of chronic diseases and disabling conditions [21]. Ideally, practice for healthy aging should include a combination of aerobic, strengthening, and flexibility exercises [21]. Paneurhythmy is an excellent practice for healthy aging, because it contains non-traumatic, aerobic and strengthening exercises good for maintaining the flexibility. Additionally, it significantly improves the balance in middle aged [2] and we foresee it as suitable for effective early prevention of falls in elderly people.

**Paneurhythmy as an attractive physical activity in health-promotion settings**

Physical inactivity is now identified as the fourth leading risk factor for global mortality. Physical inactivity levels are rising in many countries with major implications for the prevalence of non-communicable diseases and worsening of general health of the population worldwide [24]. Physical inactivity is estimated as being the principal cause for approximately 21–25% of the breast and colon cancer burden, 27% of diabetes and approximately 30% of ischemic heart disease burden.

Health-related behavior changes are increasingly important because many health conditions are becoming more chronic and less susceptible to biomedical interventions [25]. Beneficial changes in health-related behavior such as physical activity is part of the primary and secondary preventive health care, i.e. an important mechanism for maintaining health.

Paneurhythmy is an accessible, pleasant and effective group outdoor physical activity. So, it is easier to practice it on a regular basis and for years. The regular practicing of Paneurhythmy may help the primary and secondary prevention of major non-communicable diseases such as obesity, coronary heart disease and type 2 diabetes, in which the physical activity is a proven protective factor.

There are many exercises and activities which have a complex impact on health and positively affect both the physical and the mental state, even the social welfare of the practitioners. Physical

activities such as Paneurhythmy, which are significantly improving all aspects of health, have a higher overall health positive.

Because of its unique harmonious combination of components (movement, music, speech, socialization, contact with Nature and philosophy) even a 5-6 month Paneurhythmy training for beginners has a strong positive impact on the mental health of the practitioners [2]. Controlled researches revealed that a basic training in Paneurhythmy in the course of 5-6 months (2-1 weekly sessions respectively) had reduced Perceived Stress and Depression and had increased Sense of Coherence, Ego Resiliency, Optimism and Hope measured with popular psychological scales adapted in the Bulgarian language (PSS, BDI-2, SOC, ER89, LOT-R and THS) [2]. Modern controlled researches are showing the significance of these psychological risks or protective factors for the major non-communicable diseases: depression [26,27,28,29], stress [30,31,32,33] optimism [34,35,36] and hope [37,38,39,40].

Paneurhythmy is an effective mind-body-spirit practice for maintaining and improving health and quality of life of social groups and countries, which have insufficient financial resources for expensive preventive health care services [2]. It is extremely accessible regardless of the age, financial condition or physical characteristics of the practitioners, because it can be performed by people of age from 5 to 85 years, it does not require expensive equipment or facilities and it is also suitable for people with certain chronic physical disorders. The movements involved in Paneurhythmy are smooth, performed at a low absolute intensity and with short pauses between the exercises.

Paneurhythmy possesses the potential to achieve significant results with minimum investments and resources.

## Conclusion

Paneurhythmy is a unique system of rhythmic group outdoors exercises for the human mind-body-spirit unity. It puts the participants in touch with the higher forms of life such as beauty, arts, virtues and Nature. It is a precious part of the Bulgarian spiritual treasury and the world cultural and spiritual heritage. Nevertheless, we are still at the dawn of its research and dissemination. Paneurhythmy is a very pleasant and effective practice. It validates the ancient maxim "A healthy mind in a healthy body". In an accessible and gracious way the regular practice of Paneurhythmy can improve the physical, emotional, mental and social condition of the individual.

## Author Disclosure Statement

No competing financial interests exist.

## References:


1. Beinsa Douno (1938) *Paneurhythmy*. Sofia. [in Bulgarian]
2. Chervencova, L. (2013) *Paneurhythmy, health and wellness: a Bulgarian model of physical activity*. St. Kl. Ohridski University Press. [in Bulgarian] <http://press-su.com/public_ftp/incoming/62/814/Panevritmia.pdf> [accessed 02.11.20015].
3. Beinsa Douno (2004) *Paneurhythmy*. Bialo Bratstvo Publishers, Sofia, <http://www.panevritmia.info/images/uploads/Paneurhythmy_2004_english.pdf> [accessed 3.11.2015].
4. *Guide of the speech of Master Beinsa Duno* (2004) Sofia, Ekspres-Borislav Hristov. [in Bulgarian]
5. Bachev (2015) M. Intuition and logic: a dialogue about the spiritual and philosophical worldview of Peter Deunov. *First National Conference: Peter Deunov, The Master in the cultural space of Bulgaria*, 21-37. [in Bulgarian]
6. Beinsa Douno (2002) *Health and sickness* (Excerpts from lectures on the problems of human health. Complied by Dr. Vassil Velev), Vsemirno bialo bratstvo Publishers, Sofia.
7. *Rays of the Sun. Music, Movements and Words by the Master*, 1942, Sofia. [in Bulgarian]
8. Beinsa Douno (2013) *Paneurhythmy*. Bialo Bratstvo Publishers, Sofia. [in Bulgarian]
9. Beinsa Douno (2000) *Harmonizing of the Human Soul*, vol.2, Bialo Bratstvo Publishers, Sofia. [in Bulgarian]

10. Chervencova, L. (2002) Analysis of the Paneurhythmy exercises seen from a physiotherapeutic point of view. *J Sport & Science*, 3:70-6.

11. Ancheva D (2003) Quantitative analysis of the text of Paneurhythmy with a content analysis method, *II Scientific Conference - Paneurhythmy: a system for the harmonious development of people and society – reports*, Sofia, 52-75.

12. Deunov, P. (1942) *Everything that is written - Sunday lectures in 1917*, Litopechat, Sofia.

13. Deunov, P. (2010) *Health, strength and life*. Excerpts from lectures - compiler Dr. S. Baltova, Hermes, Plovdiv.

14. Konstantinov M., Boev, B., Todorova, M., Nikolov, B. (2011) *Teacher. Conversations at Seven Lakes*, Bialo Bratstvo Publishers, Sofia.

15. Doskin V., Lavrentieva N. (1984) *The rhythms of life*. Medicine and Sports. [in Bulgarian]

16. Chervencova, L (2004) Psycho-physical changes occurring in Paneurhythmy practice: a questionnaire survey, *Sports, society, education*, 166-78.

17. Chervenkova, L, Zshelyazkova-Koynova, Z. (2012) Influence of Paneurhythmy training for begginners on quality of life and health. *Sport and Science*, issue; 4:115-22. [in Bulgarian]

18. Farkas, Dávid, and Gábor Orosz. (2015) Ego-Resiliency Reloaded: A Three-Component Model of General Resiliency. Ed. Jakob Pietschnig. *PLoS ONE*10.3; e0120883. <*http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0120883*>[accessed 12.11.2015]

19. Nel, D. J., Anne Crafford, and Gert Roodt SA (2004) The relationship between sense of coherence and goal setting. *Journal of Industrial Psychology*, 30:46-55.

20. Sherrington, C., A. Tiedemann, N. Fairhall, JC Close, SR Lord (2011) Exercise to prevent falls in older adults: an updated meta-analysis and best practice recommendations. *New South Wales Public Health Bulletin*, 22:78–83.

21. ACSM Position Stand (2009) Exercise and Physical Activity for Older Adults. *Medicine & Science in Sports & Exercise*, 1510-30.

22. Tiedemann A, Sherrington C, Close JCT, Lord SR (2011) Exercise and Sports Science Australia position statement on exercise and falls prevention in older people. *J of Science and Medicine in Sport*;14:489-95.

23. Chervenkova, L., Zsheliaskova-Koynova, Z. (2010) Therapeutic Potentiality of Paneurhythmy. Erasmus Programme of the European Community for higher education - *Introducing Paneurhythmy: Fit, Creative and Social with the Bulgarian System for Recreation*. Ed. Petrov, L., VelikoTarnovo, St. Cyril and St. Methodius University Press, 59-65. <http://ip-recreation.eu/index.php/en/lectures/cat_view/10-ludmila-chervenkova-zshivka-zsheliaskova-koynova> [accessed 16.10.2015]

24. WHO (2010) Global Recommendations on Physical Activity for Health, *WHO Library Gataloguing-in-Publiation Data*.

25. Webel, A.R., Okonsky, J., Trompeta, J. and Holzemer, W.L. (2010) Systematic review of the effectiveness of peer-based interventions on health-related behavior in adults, *Am J Pub Health*, 100: 247–53: http://www.ncbi.nlm.nih.gov/pubmed/20019321> [accessed 19.06.2012]

26. Pouwer F, Nefs G (2013) Adverse Effects of Depression on Glycemic Control and Health Outcomes in People with Diabetes (A Review), *Arie Nouwen Endocrinol Metab Clin N Am*,42, 529–44.

27. Ehrenthal JC, Herrmann-Lingen C, Fey M, Schauenburg H (2010) Altered cardiovascular adaptability in depressed patients without heart disease. *World J Biol Psychiatry*,11:586–93

28. Möller-Leimkühler (2010) Higher comorbidity of depression and cardiovascular disease in women: a biopsychosocial perspective. *AM World J Biol Psychiatry*;11:922-33.

29. Wang Y, Zhao X, O'Neil A, Turner A, Liu X, Berk M. (2013) Altered cardiac autonomic nervous function in depression. *BMC Psychiatry*;13:187. PMID: 23842138

30. Mommersteeg PM, Herr R, Zijlstra WP, Schneider S, Pouwer F. (2012) Higher levels of psychological distress are associated with a higher risk of incident diabetes during 18 year follow-up: results from the British household panel survey. *BMC Public Health*;12:1109.

31. Roemmich JN, Lambiase MJ, Balantekin KN, Feda DM, Dorn J. (2014) Stress, behavior, and biology: risk factors for cardiovascular diseases in youth. *Exerc Sport Sci Rev*;42:145-52.

32. Steptoe A, Kivimaki M. (2012) Stress and cardiovascular disease. *Nat Rev Cardiol*.;9: 360–70.

33. Hamer M. (2012) Psychosocial stress and cardiovascular disease risk: the role of physical activity. *Psychosom Med*;74:896–903.

34. Kubzansky LD, Sparrow D, Vokonas P, Kawachi I. (2001) Is the glass half empty or half full? A prospective study of optimism and coronary heart disease in the Normative Aging Study. *Psychosom Medicine*;63:910–16.

35. Giltay EJ, Kamphuis MH, Kalmijn S, Zitman FG, Kromhout D. (2006) Dispositional optimism and the risk of cardiovascular death: The Zutphen Elderly Study. *Archives of Internal Medicine*;166:431–36.

36. Tindle HA, Chang YF, Kuller LH, Manson JE, Robinson JG, Rosal MC, et al. (2009) Optimism, cynical hostility, and incident coronary heart disease and mortality in the Women's Health Initiative. *Circulation*;120:656–62.

37. Everson SA, Goldberg DE, Kaplan GA, Cohen R D, Pukkala E, Tuomilehto J, Salonen J T (1996) Hopelessness and risk of mortality and incidence of myocardial infarction and cancer. *Psychosom Med*;58:113-21.

38. Everson SA, Kaplan GA, Goldberg DE, Salonen R, Salonen JT (1997) Hopelessness and 4-year progression of carotid atherosclerosis. The Kuopio Ischemic Heart Disease Risk Factor Study. *Arterioscler Thromb Vasc Biol*;17:1490-5.

39. Everson SA, Kaplan GA, Goldberg DE, Salonen JT (2000) Hypertension incidence is predicted by high levels of hopelessness in Finnish men. *Hypertension*;35:561-7.

40. Anda R, Williamson D, Jones D, Macera C, Eaker E, Glassman A, Marks J. (1993) Depressed affect, hopelessness, and the risk of ischemic heart disease in a cohort of U.S. adults. *Epidemiology*;4:285-94.

УДК 615.825.1

## Представляя Паневритмия – групповые упражнения, музыка, поэзия, геометрия и природа объединены в пользу здоровья

[1] Людмила К. Червенкова
[2] Николай Н. Ишев

[1] Национальная Академия Спорта "В. Левски", Болгария
главный ассистент кафедры „Лечебная физкультура и рехабилитация“
Магистр лечебной физкультуры , доктор п.н.
E-mail: l.chervenkova@gmail.com
[2] Бакалавр лечебной физкультуры

**Аннотация.** Растущее число научных публикаций и исследований изучают практики с глобальным воздействием на здоровье человека. Как относительно новая практика тела и ума паневритмия является наименее известным и наименее изученным в сравнении с аналогичными деятельностями, как йога и тай-чи. Паневритмия это универсальная двигательная практики, которая может объединить людей, независимо от их расы, пола, возраста, национальности и религии. Это уникальная система гимнастических музыкальных упражнений, выполняемых на открытом воздухе как групповая деятельность. Паневритмия была создана между 1922 и 1944 в Болгарии Петром Дыновым (1864-1944). Паневритмия имеет глубокий философский смысл и гармонично сочетает в себе музыку, движение, мысль и слово. Участники поддерживают вертикальное и хорошо сбалансированное положение, двигаясь парами по кругу. Каждое из упражнений паневритмии показывает основную философскую идею, выраженную через его имя, движений, музыки и лирики его песни. Движения паневритмии плавные и следуют музыкальные ритмы, которые исполнены в

медленных и умеренных темпах. В настоящей статье обсуждаются взгляды автора паневритмии касающих ее целей и эффекта, она также дает представление об основных компонентах паневритмии и перечисляет некоторые из исследований о ней. Упражнения Паневритмии легко исполнять, независимо от возраста, финансового состояния и физических характеристик практикующих. Паневритмия приятный и очень эффективный метод введения в действие древний афоризм "здоровый дух в здоровом теле".

**Ключевые слова:** упражнения на воздухе, практика тела и ума, Баланс, психическое здоровье; болгарская гимнастика.

Published in the Russian Federation
European Journal of Physical Education and Sport
Has been issued since 2013.
ISSN: 2310-0133
E-ISSN: 2310-3434
Vol. 10, Is. 4, pp. 181-185, 2015

DOI: 10.13187/ejpe.2015.10.181
www.ejournal7.com


# Sports Ethics Relativity: Point of View of Athletes and Sport Community Members

Andrius Kardišauskas

Lithuanian Sports University, Lithuania
6, Sporto Str., Kaunas 44221
E-mail: andrius.kardisauskas@gmail.com

**Abstract.** There is a lack of scientific research and articles which analyze professional athletes' ethics. The main purpose of this article – to analyze the ethics of professional athletes and compare the results with the remaining part of the sports community. The study is based on a quantitative survey, which was conducted with 115 (65 men and 50 women) sport community members. Participants' age in this study ranged from 16-43. The respondents were divided into two groups: test and control. The population of the test group consisted of 41 (23 men and 18 women) professional athletes. The test group's age in this study ranged from 16-36. The control group consisted of 74 (42 men and 32 women) sport management and training systems students. The Control group's age ranged from 19-43. The study observed one statistically significant difference ($p < 0.01$): the test group has lower ethical evaluation of autonomy than the control group.

**Keywords:** philosophy of sport, morality of modern sport, sport.

## Introduction

In 2002 CCSE (Canadian Centre Sport of Ethics) conducted a social survey in order to assess the impact of sport on youth values. The social survey helped by classifying youth social environments in which moral values are most successfully formed: family (50%); sports community (40%); school (32%); friends (29%); church and religion (22%); professional sports (17%); music and entertainment industry (14%) [1]. CCSE social survey revealed the contradictory public opinion. Community sports have always been received well by the general public. However professional sports receive a cynical and negative response due to corruption.

The values of professional sports and community moral values do not always coexist together. That is why sport critics have criticized the negative historic and cultural progression of modern sport for decades [2, 3, 4]. Harmony between professional sports and public moral values has been a fundamental problem in the philosophy of sport [5]. Every professional athlete has his own personal beliefs, how to behave in the community and during the game [6]. However, professional players feel the sense of responsibility to form only a positive image of a professional athlete [7, 8].

The main focus of Lithuanian sports scientists - amateur athletes and educology issues [9, 10], although professional sports are socially the most visible part of sports. Though Lithuanian sports scientists try to publish articles about the professional sports' cultural and moral issues [11], however, there is not enough extensive research or articles about moral values and behavior of professional athletes.

**Scientific novelty:** the present research will provide the first thorough analysis of the components of sports ethics among professional athletes.

**The aim of the research** is to analyze the ethics of professional athletes and compare the results with the remaining part of the sports' community.

**Research methods**

*Participants.* 41 professional athletes (22 men and 18 women), 3 basketball teams and 1 soccer club participated in the quantitative survey. These professional clubs compete at the highest sports league in Lithuania: "A lyga" ( Lithuania Football League); "NKL" (National Basketball League); "LMKL" (Lithuanian Women's Basketball League). Professional athletes were assigned to test group called "players". The age of the test group ranged from 16 - 36 years.

74 students of sport management and training systems study program (42 men and 32 women) also participated in the quantitative survey. All of the students were assigned to the control group called "coaches/managers". The age of the control group ranged from 19 - 43 years. A total, 115 sports community members (65 men and 50 women) participated in the quantitative survey. The age of respondents' ranged from 16-43 years.

The questionnaire of quantitative survey was created by researchers from "Gdansk University of Sport and Physical Education" [12]. In 2012, the researchers Ziółkowski, Strzałkowska, Sakłak, Zarańska and Bonisławska, published a questionnaire of sport ethics. Its internal consistency was approved by SPSS statistical calculations (Cronbach's alpha (0.891)). The questionnaire consisted of 52 issues. The respondents had to evaluate the situations in 7 - point scale (from -3 to 3). The respondents' answers were classified in five ethical codes: ethics of autonomy; ethics of collectivism; ethics of common good; ethics of dignity; ethics of productivity.

*Ethics of autonomy*. Central value - goodness of another individual. Cardinal virtues - respect for prosperity, law and freedom of individuals; helping other people and loyalty towards individuals. Major sins are doing harm to others, violating rights (physical, psychological, moral) and disloyalty to people.

*Ethics of collectivism*. Central value – good of a social group. Cardinal virtues – respect for goodness, law and interests of a social group; sustaining group's integrity, loyalty towards the group. Major sins - acting to the detriment of a group, disloyalty, breaking group's integrity.

*Ethics of common good.* Central value – prosperity of a community as a whole. Cardinal virtues - respect for norms of which the society is beneficiary as a whole, even when a specific individual or social groups gain nothing or they lose. Major sins are violating norms of which the society is beneficiary, even when a subject, a specific individual or social groups gain nothing after obeying them.

*Ethics of dignity*. Central value – living with dignity. Cardinal virtues - spirituality, honor, contempt for material values, sustaining integrity (of class, of caste). Major sins - loss of "honorable capability", improper form, pursuit of material values, changing time - honored customs.

*Ethics of productivity*. Central values – production of good. Cardinal values - usefulness, effectiveness, economy, success. Major sins are lack of productivity, laziness, waste of values and time.

Participants were asked to record their sociodemographic variables such as gender, age, and sport team. The survey was conducted in compliance with the ethical principles and applicable legislation, i. e. each respondents was explained the goal of the study and was ensured that the questionnaires were anonymous. The duration of the survey was 25 minutes.

*Statistical analyzes* were performed by using SPSS 22.0 program for the Windows's operating system. The data were processed by Mann–Whitney U test.

**Results**

The mean scores results of the both groups are presented in Table 1.

Table 1: Mean scores of five ethical codes among players (n=41) and coaches/managers (n=74)

| Ethical codes | Mean scores of ethical codes among players | Mean scores of ethical codes among coaches/managers |
|---|---|---|
| Ethics of autonomy | 3.98 | 4.29 |
| Ethics of dignity | 3.95 | 4.04 |
| Ethics of collectivism | 4.01 | 4.09 |
| Ethics of common good | 3.89 | 4.00 |
| Ethics of productivity | 4.37 | 4.29 |

After the evaluation of quantitative survey results of test group (players) and control group (coaches/managers) (Table 2) the study observed one statistically significant difference ($p < 0.01$). The test group (players) had a lower ethical evaluation of autonomy than the control group (coaches/managers). The analysis of the evaluation of dignity and common good resulted in the lower mean scores in case of players but there were no statistically significant differences between players coaches/managers (Table 2).

Table 2: Statistical comparison between players (n=41) and coaches/managers (n=74) characteristics of five ethical codes

| Ethical codes | U | *p* |
|---|---|---|
| Ethics of autonomy | 0884.50 | 0.00 |
| Ethics of dignity | 1277.00 | 0.16 |
| Ethics of collectivism | 1286.00 | 0.18 |
| Ethics of common good | 1193.00 | 0.06 |
| Ethics of productivity | 1374.50 | 0.40 |

*Note. U – Mann-Whitney U statistics score, *p* – level of significance.

**Discussion**

Research results confirm a provision that modern sport does not have the interface points with moral character improvement. Even if sport does promote courage, cooperation, perseverance and self-discipline, it is not clear that these character traits will transfer to other areas and contexts of life – and so count as moral virtues proper. On account of the competition, a sport tends to generate an in-group and an out-group, to whom words like 'hate' and 'beat' are often applied [13].

A significant part of people in western civilization are convinced that tolerance in the world of globalization, in the world of moving people and their cultures, is a social necessity. The necessity, natural or social, is not discussed but respected. [14]. But tolerance does not always mean moral values. It shows that at the level of values, all events, including humans, are equivalent to the extent. They can be treated as means for the sake of better life, security, greed, production, technical progress, genetic manipulation, and even social functioning [15].

The fundamental problems in ethics of autonomy are much more complex than cheating or unsporting behavior [16]. Describing some behavior as cheating is typically little more than expressing strong, but thoroughly vague and imprecise, moral disapproval or condemnation of another person or institution about a wide and ill-defined range of improper advantage-seeking behavior. For the purposes of any serious discussion about improper conduct in sport (or elsewhere), we should avoid the concept and focus on deeper issues [17].

The existence of the obligation to follow rules in sport is widely accepted, but there are only a few studies that provide accounts that justify it [18].

**Conclusion**

1. Cultural field of modern sport has potential to change ethical values of other community members.

2. Players had a lower ethical evaluation of autonomy than the control group (coaches/managers). Members of sports communities are not responsible for lower ethical evaluation of autonomy.

**References:**

1. Canadian Centre for Ethics in Sport. Internet WWW page, at URL: http://www.cces.ca/files/pdfs/CCES-RPT-2002Survey-E.pdf. 2002.
2. Santayana G. Philosophy on the Bleachers. Harvard monthly, 1894. Vol. 18, № 5. P. 181-190.
3. Orwell G. The sporting spirit. The collected essays, journalism and letters of George Orwell, 1945. P. 440-443.
4. Guttmann A. (1978). From ritual to record. Columbia University Press.
5. Bäck A. The way to virtue in sport. Journal of the Philosophy of Sport, 2009. Vol. 36, № 2. P. 217-237.
6. Dee P.T. Ethical Aspects of Representing Professional Athletes. Marquette Sports Law Review, 1992. Vol. 3, № 111. P. 111-122.
7. Wong L. L., Trumper R. Global celebrity athletes and nationalism football, hockey, and the representation of nation. Journal of Sport and Social Issues, 2002. Vol. 26, № 2. P. 168-194.
8. Tainsky S., Babiak K. Professional athletes and charitable foundations: An exploratory investigation. International Journal of Sport Management and Marketing, 2011. Vol. 9, № 3. P. 133-153.
9. Šukys S., Zakrasienė-Stankevičiūtė V., Nickus E., Šukienė E. Manifestation of prosocial and antisocial behavior in a basketball match. Education. Physical training. Sport, 2011. Vol. 4, № 83. P. 69-76.
10. Šukys S., Jansonienė A. J. Relationship between athlete's values and moral disengagement in sport, and differences across gender, level and years of involvement. Education. Physical training. Sport, 2012. Vol. 1, № 84. P. 55-61.
11. Genys D. Theorizing structure of Lithuanian sport field. Sports Science, 2012. Vol. 3, № 69. P. 8-13.
12. Ziółkowski A., et al. Questionnaire of Sports Ethics–a Tool for Assessing Moral Behaviour in Sport. Baltic Journal of Health and Physical Activity, 2012. Vol. 4.4. P. 277-283.
13. Bäck A. The way to virtue in sport. Journal of the Philosophy of Sport, 2009. Vol. 36, № 2. P. 217-237.
14. Rarot H. Why do we have to be tolerant? Tolerance in the light of modern political philosophy. Philosophy. Sociology, 2008. Vol. 1-2, P. 3-10.
15. Mickunas A. Transcendental ground of all values. Philosophy. Sociology, 2008. Vol. 3-4, P. 38-48.
16. Karon D. R. Winning Isn't Everything, It's the Only Thing, Violence in Professional Sports: The Need for Federal Regulation and Criminal Sanctions. Indiana Law Review, 1991. Vol. 25, № 147. P. 147-163.
17. Russell J.S. Is There a Normatively Distinctive Concept of Cheating in Sport (or anywhere else)? Journal of the Philosophy of Sport, 2014. Vol. 41, № 3. P. 303-323.
18. Ciomaga B. Rules and obligations. Journal of the Philosophy of Sport. 2013. Vol. 40, № 1. P. 19-40.

УДК 179.9

# Относительность спортивной этики: точка зрения спортсменов и представителей спортивных сообществ

Андрюс Кардишаускас

Литовский университет спорта, Литва
44221 г. Каунас, ул. Спорто, 6
E-mail: andrius.kardisauskas@gmail.com

**Аннотация.** В настоящее время существует недостаток научных исследований, которые посвящены анализу вопросов спортивной этики. Основная цель этой статьи – проанализировать оценку спортивной этики с точки зрения спортсменов и других представителей спортивных сообществ. Объем выборки для исследования – 115 (65 мужчин и 50 женщин) представителей спортивных сообществ. Возраст участников в этом исследовании составлял от 16 до 43 лет. Респонденты были разделены на две группы: тестовую (исследуемую) и контрольную. Тестовая группа состояла из 41 (23 мужчин и 18 женщин) профессионально спортсмена. Возраст тестовой группы в данном исследовании составлял от 16–36 лет. Контрольная группа состояла из 74 (42 мужчин и 32 женщин) студентов – будущих тренеров и спортивных менеджеров. Возраст контрольной группы варьировал от 19 до 43 лет. Выявлено, что в тестовой группе получены более низкие показатели по оценке автономии, чем в контрольной группе.

**Ключевые слова:** философия спорта, мораль современного спорта, спорт.


Published in the Russian Federation
European Journal of Physical Education and Sport
Has been issued since 2013.
ISSN: 2310-0133
E-ISSN: 2310-3434
Vol. 10, Is. 4, pp. 186-191, 2015

DOI: 10.13187/ejpe.2015.10.186
www.ejournal7.com

# Effect of Pubertal Maturation on the Development of Anaerobic Power (in College students 11-16 years of Algeria)

[1] Belkacem Khiat
[2] Hacène Mehdioui

[1] Institute of Physical Education and Sports
[2] University of Science and Technology Mohamed Boudiaf of Oran, Algeria
University Hospital of Constantine; Service Functional Exploration and Respiratory, Constantine, Algeria

**Abstract**

The aim of this long study was to examine the pattern of change of boy's anaerobic power during the different stages of puberty.

82 sedentary scholar boys aged from 11 to 16 years agreed to been followed for 2 years, in their schools. We proceed to measure the different anthropometric indicators. Stages of maturation were estimated according to Tanner's classification. The evaluation of the anaerobic process was done through the speed-force's test of Vandewalle. The results show that the majority of morphological indicators of the population developed very significantly from the first to the fourth stage of puberty. The transition from the second to the third stage of puberty seems decisive in the evolution of major morphological and physiological effort parameters. From stage 1 to stage 4 there has been a very significant development ($p<0.001$) of Anaerobic Maximal Power (Wanmax) and Maximum Force (Fo).

Among boys, the passage from the second to the third stage of puberty seems decisive in the evolution of principles morphological and physiological parameters of the effort.

**Keywords:** puberty stages, anaerobic power, scholar boys, anthropometric indicators.

## Introduction

Childhood and adolescence as transitions to adulthood, have a number of important features that play a role in the possibilities of physical and mental effort.

The growth and maturation of speeds differ among children. A variety of factors can influence the growth and maturation as genetic inheritance, nutritional history and overall health. Regarding the effort capacity, it appears that puberty brings substantial changes and distinct physical potential in the same chronological age (GRODJINOVSKYA and BAR-OR, 1984; MURASE, 1981. Aires et al, 2010). In contrast to adults, children and adolescents have the so-called sensitive phases during which the optimal development of the main forms of effort can be made to varying degrees and at different times. Physiologically a pre-pubescent child is characterized by a relatively well developed aerobic metabolism compared to adults. Aerobic maximum opportunities and muscle oxidative enzyme activities deviation (Krebs cycle) are equal and even often superior to those of adults. Instead lactic anaerobic metabolism is commonly regarded as inefficient and immature pre-pubescent ages. The maximum power characterizes the

energy sector and its measurement has long been a definite interest in monitoring and improving anaerobic physical skills in different sports. Furthermore anaerobic metabolism of children is relatively little studied; Yet the spontaneous physical activity in children is largely made up of short sprints where anaerobic metabolism is widely sought. Measuring the power of anaerobic metabolism becomes important in children since it is the ideal time to detect young talents and guide them towards explosive sports. The increase in lactic anaerobic power and alactic was found according to age (GRODJINOVSKYA and BAR-OR, 1984; MURASE 1981). Some recent research question this immaturity of anaerobic system during childhood (RATEL and Martin, 2012). The muscle glycolytic enzyme activities are always lower than those of adults. The anaerobic ability, unlike aerobic abilities seems closely related to muscle mass, as well as other factors such as muscle architecture, fiber composition, substrate availability, accumulation of metabolites (lactic acid), metabolic cycles and their activity levels (KEMPER, 1985; Tanner, 1962).

Intense and persistent efforts, with above maximum intensities (> VO2max), are frequently encountered in team sports and are mostly made spontaneously by the children. The adaptation and evaluation of workouts or physical education and sport for a better physical performance without harming the health of young practitioners is one of the major concerns of sports educators. To account for the effects of puberty and considering the significant changes that accompany adolescence we studied the maximum anaerobic power based on the five stages of pubertal Tanner staging (1962). These stages take into account the state of maturation of sex organs and development of body hair. The purpose of this study is to assess anaerobic power of Algerian schoolchildren non-athletes during their biological development.

**Materials and methods**

Eighty-two (82) sedentary college boys aged 11 to 16 years participated in the study after parental consent. The protocol was carried out within their school.

**Protocol**

Each subject was examined before being allowed to follow the following protocol which was used on three occasions over a period of two years:

***The following anthropometric measurements were taken:***

- Assessing the height using a fathom;
- Assessment of body weight using a balance type HB-LO5;
- Measurement of the perimeters of the body (maximum perimeters biceps, thigh, calf) using a tape measure;
- Measurement of four skinfolds (biceps, triceps, subscapular, supra-iliac) with a pair of skin folds (type Harpenden);
- The percentage of fat (% PF) was obtained by the method of four skinfolds in the words of Durnin and Rahaman (1967);
- We calculated lean body mass (LBM) :(LBM = mass -% PF / 100);

Anthropometric measurements were all carried out on the left side of the body by the same examiner.

***Determination of pubertal stages according to Tanner staging (1962). These indices distinguish five maturation levels characterizing the sexual modifications undergone by the growth path in body:***

- Stage 1: existence of pubic fuzz. Testicles, scrotum and penis size even in childhood;
- Stage 2: a few scattered hairs, long, straight or curly at the base of the penis. Increasing the volume of the

scrotum and testicles. Volume penis little or no change;

- Stage 3: denser hair, thicker and curlier extending little above the pubic symphysis. Scrotum and testicles as

well as increase penis length;

- Stage 4: adult appearance, but the hair region remains less extensive (no extension to the thighs). Penis

Enlargement and development of the glans. Testes and scrotum continue to grow. Dark color;

- Stage 5: hairiness has adult appearance location and quantity. Extension of the hair region thighs. Adult

genitalia.

Evaluation anaerobic process by the test Force-speed Vandewalle (1989): for test-load speed, we used a cycle ergometer weight type Monark (894th model, Sweden). This was linked to a computer that calculates micro among other peak power output. The test is performed on a cycle ergometer whose wheel undergoes a braking force caused by tensioning a strap in proportion to the weight hanging on the end. A resistance of 4 kg is imposed on the first attempt and will grow from 2 in 2 for the following efforts up to 12 Kg. The subject makes the sprint 6 seconds maintaining the sitting position. Five events, with a different strength, are performed. The test is stopped when the speed reaches 90 revolutions / min. A passive recovery 3 to 5 minutes is required between levels. Fo values (maximum force), Vo (maximum speed) and Wanmax (Maximum Power), are directly on a graph.

**Statistical analysis**

The results were expressed by their average and standard deviations based on the pubertal classification. We conducted analyzes of variance (ANOVA) to study the evolution of the various parameters at different stages of biological maturation.

**Results:**

On the morphological parameters as shown in Table 1, we found a very significant change in all indices from first to fourth pubertal stage (S1 to S4) except for percent fat (% PF).

| Pubertal Stages | AGE (an) | Height (cm) | Weight (kg) | Percentage of Fat (% P.F.) | Lean Body Mass (LBM) (kg) |
|---|---|---|---|---|---|
| **S 1 (n= 13)** | 12.30 | 150.46 | 43.38 | 10.74 | 38.42 |
| | *± 0,6* | *± 7,13* | *± 8,26* | *± 4,84* | *± 5,63* |
| **S 2 (n= 32)** | 13.15 | 155.30 | 44.36 | 7.72 | 40.24 |
| | *± 0,7* | *± 7,32* | *± 8,13* | *± 4,63* | *± 6,35* |
| **S 3 (n= 23)** | 14.04 | 163.11 | 52.61 | 9.8718 | 46.49 |
| | *± 0,8* | *± 6,91* | *± 9,19* | *± 7,84* | *± 6,80* |
| **S 4 (n= 14)** | 14.99 | 168.00 | 56.31 | 8.72 | 50.93 |
| | *± 0,6* | *± 5,7* | *± 6,88* | *± 2,55* | *± 5,87* |

Table 1: Morphological clues as pubertal stages

In general it was found (Table 2) from stage 1 to stage 4 there has been a very significant change ($p < 0.001$) Anaerobic Max Power (Wanmax) and the Maximum Strength (Fo). The evolution of the Maximum speed (Vo) was less significant ($p < 0.05$) during the same interval.

| Pubertal Stages | Wan max (watts) | Fo (kgf) | Vo (trs/mn) |
|---|---|---|---|
| **S 1 (n= 13)** | 265.97 | 7.56 | 173.12 |
| | *± 64,03* | *± 2,28* | *± 83,35* |

| | | | |
|---|---|---|---|
| **S 2 (n= 32)** | 327.02 | 9.65 | 147.61 |
| | *± 100,55* | *± 2,41* | *± 20,35* |
| **S 3 (n= 23)** | 448.61 | 10.92 | 172 |
| | *± 104,72* | *± 2,38* | *± 21,30* |
| **S 4 (n= 14)** | 544.50 | 14.38 | 168.51 |
| | *± 116,46* | *± 5,87* | *± 20,88* |

Table 2: The physiological indices according to pubertal stages

The most significant (Table 3) were identified from S2 to S4, especially between stages 2 and 3 for the indices of the Anaerobic Max Power (Wanmax) and Vo (P <0.001), and to a lesser degree Fo (P <0.05).

| **Pubertal Stages** | **S1-S2** | **S2-S3** | **S3-S4** | **S1-S3** | **S2-S4** | **S1-S4** |
|---|---|---|---|---|---|---|
| | F P | F P | F P | F P | F P | F P |
| **Wanmax** | 4.10 * | 22.33 *** | 7.58 ** | 19.66 *** | 24.29 *** | 25.88 *** |
| **Fo** | 7.19 ** | 4.31 * | 7.51 ** | 8.96 *** | 10.29 *** | 11.75 *** |
| **Vo** | 2.76 ns | 20.84 *** | 0.27 ns | 3.65 * | 11.71 *** | 2.92 * |

Table 3: Evolution of physiological indices for all intervals of pubertal stages

**Discussion**

The results show that the majority of morphological indices of the study population evolved very significantly from the first to the fourth stage of puberty. These results are similar to those found by various authors (Åstrand 1976; Pineau, 1991. Weltman et al, 1986; ZAUNER, Maksud and MELICHNA 1989). This trend is more significant between stages 2 and 3, which is at the peak of growth often reported by several studies (BUCKLER, 1990; Kemper, 1985; Weltman et al, 1986;. Ortega et al. 2011).

As against this, notes the absence of a significant change in the percentage of fat (% PF) and its relative stability as reported by some researchers (Armstrong et al., 1995; HERTOGH, MICALLEF and Mercier, 1992). This can be explained by dietary habits in connection with the social conditions that do not favor the emergence of a morphotype with significant fatty layer.

One notes a very significant increase (p <0.001) of the maximal anaerobic power (Wanmax) particularly between stages 2 and 3 as observed in several studies (HERTOGH, MICALLEF and MERCIER, 1992; Lacour, 1992; Delgado, and ALLEMANDOU PERES, 1992 and 1993; VAN PRAAGH, 2007). As to the maximum force (Fo) of the peak increase (p <0.001) is located between stages 3 and 4, that is, a little later than the Wanmax as has been noted by several authors (KEMPER, 1985; Pineau, 1991; BUCKLER, 1990).

Thus, these indices (Wanmax and Fo) can be faithful indicators for the sporty orientation, monitoring and evaluation of the effect of training during puberty (Van PRAAGH 2007; MAYLIST AMAS et al., 2002; VAN PRAAGH, DORE, 2002). Otherwise the very significant change (p <0.001) of the maximum speed (Vo) between stages 2 and 3 in parallel with the substantial increase of the Wanmax and Fo is indicative of severe muscle biochemical changes related to the metabolism anaerobic glycolysis described in the literature (HERMANSEN and OSEID 1971; DUCHE, BEDU and VAN PRAAGH, 2001; MELICHNA et al., 1983). In this sense several authors (Pineau, 1991. Weltman et al, 1986) showed that at this stage of sexual maturation, hormone secretion, particularly the increase in testosterone levels in males affects the great changes that appear in maximal strength and speed-strength and anaerobic capacity. The maturation may be a factor behind the increase in anaerobic power alactic (DUCHE et al., 2001). According VAN PRAAGH (1990) that power in young children is significantly lower than in adolescents and adults in absolute and relative terms. The growth of androgen production is almost simultaneous with that

of the maximum force. Pubertal phase is a pivotal period corresponding to a sudden production of sex hormones with anabolic properties which allow the development of the musculature (Armstrong et al., 2000; Degache et al., 2010). Also suitable training in strength and speed especially in the pubertal stage is of paramount importance for the future development of the performance of adolescents (KEMPER and NPV of KOP, 1995; KHIAT and MEHDIOUI, 2000; MANNO 1990 ; AMAS et al, 2002).

**Conclusion**

It appears that genetic dispositions appear to be involved for a significant part in determining the physical performance requiring aerobic metabolism and / or anaerobic. The transition from the second to the third stage of puberty seems decisive in the evolution of the main morphological and physiological parameters of effort (TOMKINSON, 2007; ALMUZAINI, 2007). For ethical and methodological reasons there are few studies (in particular longitudinal) on anaerobic capacity of children and adolescents .In the future the use of the technique of nuclear magnetic resonance (NMR) should offer interesting opportunities investigation of stress metabolism in children.

Objective assessment of physical abilities depending on the biological maturation stage thus proves to be a key and essential element of the training process, present in all stages of its development to edit, correct, adjust, select and / or guide preparation of the young athlete in a manner best suited to its potential.

**References:**


1. Almuzainiks (2007): Muscle function in Saudi children and adolescents: relationship to Anthropometric characteristics during growth. *Pediatr Exerc Sci ; Vol. 19 (3), pp. 319-33.*
2. Amas M.T., Erron F.F., Noury-Desvaux B., Abraham P., Saumet J.L. (2002). Influence de la maturation et de l'entrainement sur la puissance maximale anaérobie alactique. Cinésiologie *n° 205- 41e année- p 109.*
3. Aires LB Andersen, D Mendonça, C Martins, G Silva, J Mota (2010): A 3-year longitudinal analysis of changes in fitness, physical activity, fatness and screen time Acta Pædiatrica n° 99, pp. 140–144.
4. Armstrong N., Kirby J., Mcmanus A.M. Et Welsman J.R. (1995). Aerobic fitness ofprebuscent children. *Ann. Hum. Biol. 22: 427-441.*
5. Armstrong N; Welsman J. R.; Williams C. A.; Kirby B. J.*(2000).* Longitudinal changes in young people's short-term power output**.***Medicine & Science in Sports &Exercise, 32(6):1140-1145.*
6. Astrand P.O. (1976): The children in sport and physical activity-physiology. *J.G. Albinson and G.M. Andrew (ed.). Child in sport and physical activity. Baltimore: University Park Press, pp. 19-33.*
7. Buckler J. (1990): A longitudinal study of adolescent growth. *Springer verlag, London, Berlin, 430 p.*
8. Degache F., Richard R., Edouard P., Oullion R., Calmels P. (2010): The relationship between muscle strength and physiological age: A cross-sectional study in boys aged from 11 to 15. *Annals of Physical and Rehabilitation Medicine, 53 : 180–188.*
9. Delgado A., Allemandou A. and Peres G. (1992) Evolution des qualities anaérobies et ages civil, statural et pondéral et stades pubertaires. *Sciences & Sports, 7 :37-38.*
10. Delgado A., Allemandou A. and Peres G. (1993) Changes in the characteristics of anaerobic exercise in upper limb during puberty in boys. *Eur. J. Appl. Physiol., 66 : 376-380.*
11. Duché P., Bedu M. et Van Praagh E. (2001) Explorations des performances anaérobies de l'enfant. Bilan de 30 ans de recherches. *STAPS, 54 : 109-130.*
12. Durnin J. and Rahaman M. (1967). The assessment of amount of fat in the human body from measurements of skinfold thickness. *Br. J. Nutr. 21: 681-689.*
13. Grodjinovskya A. and Bar-Or O. (1984) Influence of added physical education hours
14. Up on anaerobic capacity, adiposity, and grip strength in 12-13 years old children enrolled in sports class, *in Ilmarinen J. Valimaki I. (eds): Children and Sport. Berlin, Springer Verlag, pp. 162-169.*
15. Hermansen L. and Oseid S. (1971). Direct and indirect estimation of oxygen uptake in pre-pubertal boys. *ActaPaediatrica Scandinavia, 217: 18-23 (suppl.).*

16. Hertogh C., Micallef J.P. Et Mercier J. (1992) Puissance anaérobie maximale chez l'adolescent (étude transversale). *Sciences et Sports, 7 : 207-213.*

17. Khiat B. Et Mehdioui H. (2000). Incidence des paramètres physiologiques de l'effort sur l'orientation de l'entraînement selon l'âge pubertaire. *Sciences et Technologie du Sport, n°3 :34-40.*

*18.* Kemper H.C.G. (1985). Growth, health and fitness of teenagers.*Medicine and Sport Science, vol. 20, Ed. Hebblink: 202 p.*

19. Kemper H.C.G. et Van de KOP H. (1995). Entraînement de la puissance maximale aérobie chez les enfants pré-pubères et pubères. *Science et Sports, 10 : 29-38.*

20. Lacour J.R. (1992) Biologie de l'exercice musculaire. *Edition : Masson, 199 p.*

21. Maylist Amas et coll. (2002). Influence de la maturation et de l'entrainement sur la puissance maximale anaérobie alactique. *Cinésiologie n° 205- 41e année- p 109*

*22.* Manno R. (1990). Les bases de l'entraînement sportif. *Edition : Revue E.P.S., 223 p.*

23. Melichna J., Havlickova L., Mackova E., Spynarova S. And Novak J. (1983). The composition of the muscle fiber types in junior middle-distance runners.

*24. Physician and Physical Education 6: 28-31.*

25. Murase Y., Kobayashi K., Kamei S. And Matsui H. (1981): Longitudinal study of aerobic power in superior junior athletes.*Medicine and Science in Sports and Exercise,13: 180-84.*

26. Ortega F.B. et coll. (2011) Physical fitness levels among European adolescents: the

27. Pineau J.-C. (1991) Importance de la puberté sur les aptitudes physiques des garçons

*28.* scolaires. *Bull. et Mém. De la Soc. d'Anthrop. De Paris, t. 3, n°3-4 : 275-286.*

29. Ratel S., Martin V. (2012) Les exercices anaérobies lactiques chez les enfants :la fin d'une idée reçue ? *Science & Sports n°27, 195—200.*

*30.* Tanner J.M. (1962) Growth at adolescence (2nd )*ed. Oxford, Blackwell Scientific Publications.*

31. Tomkinson Gr. (2007). Global changes in anaerobic fitness test performance of children and adolescents (1958-2003). *Scand J Med SciSports , Oct; Vol. 17 (5), pp. 497-507.*

32. Van-Praagh E., (1990) Evolution du métabolisme aérobie et anaérobie au cours de la croissance, *revue S.T.A.P.S, p291-306*

33. Van-Praagh E, Doré E. (2002). Short-term muscle power during growth and maturation. Sports Med n°32:701–28.

*34.* Van-Praagh E. (2007). Physiologie du sport: enfant et adolescent. *De Boeck Supérieur, 288 pages.*

35. Vandewalle H. Et Friemel F. (1989). Tests d'évaluation de la puissance maximale des métabolismes aérobie et anaérobie. *Science et Sports, 4 : 265-279 .*

36. Weltman A., Janney C., Rians C.B. and al. (1986). The effects of hydraulic resistance strength training in pre-pubertal males. *Med. Sci. Sports Exerc. 18: 629-638.*

37. Zauner C.W., Maksud M.G. And Melichna J. (1989) Physiological considerations in training young athletes. *Sports Medicine 8 (1): 15-31.*

Published in the Russian Federation
European Journal of Physical Education and Sport
Has been issued since 2013.
ISSN: 2310-0133
E-ISSN: 2310-3434
Vol. 10, Is. 4, pp. 192-196, 2015

DOI: 10.13187/ejpe.2015.10.192
www.ejournal7.com


# Scree as a Criteria of Development of Motional Skills

Aleksey N. Korolkov

Moscow City Pedagogical University, Russian Federation
Chair of theory and physical education methods and physical training
Associated professor, candidate of technical sciences
E-mail: korolkov07@list.ru

**Abstract**

In this article we examine different analytical relations, describing the process of development motional skill in sports. It is shown, that this process can be described as an exponential function where changes of results in sports depend on duration of training or amount of training, as Pareto distribution and Verhulst logistic function.

As a result of the research of power functions, which approximate competitive results of four mini-golf players within 5 years, we established a criteria of development of motional skills in the form of scree.

It is found, that the power function is the best one for describing improvements of sport achievements on the stage of primary training (1-2 years of training), and exponential function better fits for stages of perfecting of skills and sport mastery (more than 4 years of training). During the immersed training both models have precise enough approximation from 10-th to 70-th competitive round. Besides, all the data on sport results, starting from the very beginning of training, must be taken in the account during the process of modeling and forecasting of sport achievements.

Offered models and criteria can be used for establishing of rated norms and forecasting of results in kinds of sport with primary demonstration of coordinating capabilities of accurate performance of purposeful motions.

**Keywords:** criteria of scree, regularity of development of motional skills, Hirsch index, Pareto distribution, Verhulst equation, golf, mini-golf.

## Introduction

Development of skills and abilities is the most discussed issue in different pedagogical researches. In the scientific online library ‘eLibrary’ there are over 800 publications related to the key-word “motional skill”. Terms of “skill” and “ability” as well as different aspects of their development in different kinds of activities and in different conditions of testees [1, 2, 3, 5, 6, 8, 12] are discussed in these researches.

Even so, despite many publications about this issue, regularity of development of motional skills and abilities in the form of analytical relations practically was not revealed. It was V.A. Plahtienko [11], who first established a graphical form of regularity of development of motional skill depending on the amount of training exercises. The form of the graph resembled a hyperbola, which values declined whereas the amount of training grew up, what proofed the improvement of

sport results and increase the extent of maturity of motional skill. It is mentioned in monograph of V.G. Nikitushkin [10], that the form of this graph can be described with exponential function of time.

In the work of O.N. Khudoley [13] there are given similar analytical expressions for extent of development (level of training) of motional skill of gymnasts depending on the amount of completed work, the number of repeats and other parameters of training affects in the form of Verhulst logistic function [14].

**Materials and methods**

In our works [5, 6] after long-term observation of improvement of the result in golf and mini-golf it was established that relation of the result R on the amount of played competitive rounds X looks like (figure 1):

$$R=R_0 e^{-kX}, \qquad (1)$$

where $R_0$ stands for the result of mini-golf player, defined by inborn and obtained coordinating abilities to perform accurate actions; k stands for a coefficient, which describes educability of a sportsman, and which is equal in number to average increment for one round of game.

Those relations were set for results given by three sportswomen on official competitions held on the same golf field during 2009-2015 years. Overall for this period those sportswomen played from 79 to 107 rounds with 18 holes in each round in 20-25 competitive matches.

Similarly to exponential decay, which completely looks like (1), k is a probability of improvement of the result during the round relatively to initial result $R_0$. Similarly to technical systems k, which stands for sensitivity of the system, is a value reversed to period of time, in which the signal (reaction of the system) changes in e times.

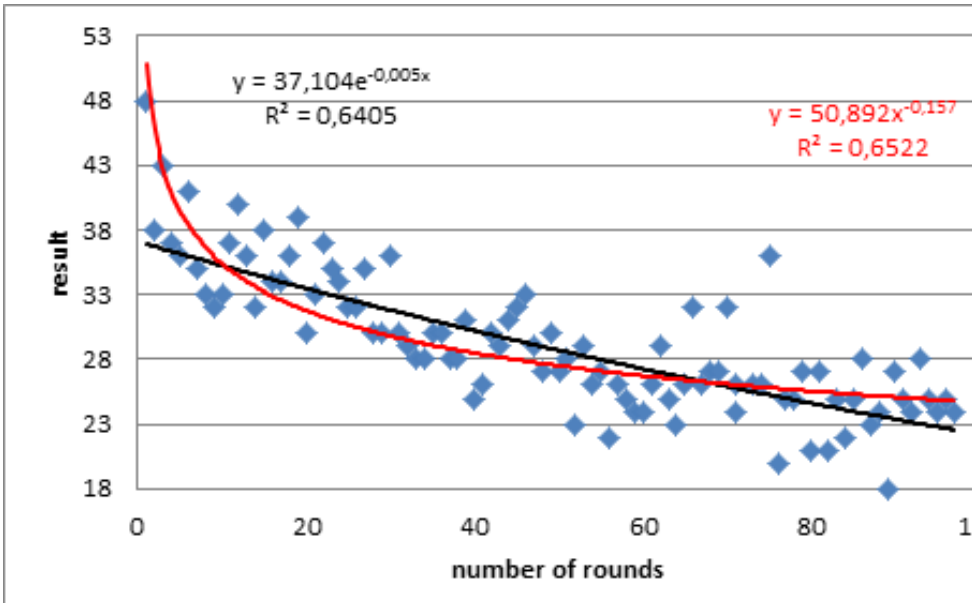


Figure 1. Alteration of the results in mini-golf depending on the number of rounds played (on the example of one sportsman 2009-2015 years)

**Organization of the research**

At the same time, approximation of given long-term observations of sport achievements with the power function like $R=(X_m/x)^k$ is as accurate as approximation with the exponential function. Unlike exponential function, power one better describes increment of the results on the stage of primary training, which is the stage of development of special motional skills. A distribution, also known as Pareto distribution, describes many different facts with good approximation: distribution of cities depending on the number of inhabitants, frequency of using of words in different languages, ratio of mastery and mass character in sports, dependence of quantity of muscular moment of force

on stimulation frequency, dependence of maximal value of excitation of heart muscle on duration of stimulation, dependence of labor efficiency on tiredness during the training etc. [7].

**Results and discussion**

Graph R(x) has two distinctive sectors. Typical feature of the first one is a fast decline of values of R(x) from left to right till some point, tangent to which crosses axles oX and oY with angle 135° (pic.2). On the second sector gradient of decrease of R(x) declines. Derivative of R(x) at this point equals to -1. In factorial analysis coordinates of this point are named criteria of scree (Cattell, 1966 [4]), and in analysis of publication activity this point is named Hirsch index [10]. Location of this point on the graph, which describes alteration of sports performance depending on the amount of training exercises, will match to the moment of regress of sports results. In the mini-golf location of this point matches to II-III junior rank, to the amount of training affects needed to develop special motional skills. Usually it takes a year of training to fulfill those sport standards, if a sportsman trains 2-3 times a week.

$X_m$ equals to minimal amount of training affects needed to achieve the absolutely best result: 18 hits in 18 holes, within which the researched system stops reacting on further increase of impetus **x**. For example, of impetus on pic. 2, where $X_m$=74 200 000 000 (seventy four billions competitive rounds). If a sportsman participates in several dozens of competitions annually, it will take him several billions years of sport career to achieve such results. That is why mathematical model of achieving high results in mini-golf in the form of power function is unsuccessful. Of course, in real life it takes much less time to achieve the absolutely best result. It takes around 6-8 years of regular training.

If we use an exponential model, than the number of competitive rounds needed to achieve an absolute result $X_m$ equals:

$$X_m=-1/k(\ln 18-\ln R_o). \quad (2)$$

And for the sportsman, whose results are described by the graph, $X_m$ equals to 145 competitive rounds, what accords to 7 years of competitive activities.

Basing on pic.1, graphs of power and exponential functions cross somewhere within 70-th round. It matches to approximately 5-th year of training and completing (attestation) of I senior rank. It means that intersection point of those two functions can serve as a criteria of development motional skill or, in other words, of the extent of mastering of the motions, that are performed vastly automatically, unconsciously [1, 6].

**Summary**

To sum it all up, that the power function is the best one for describing improvements of sport achievements on the stage of primary training (1-2 years of training), and exponential function better fits for stages of perfecting of skills and sport mastery (more than 4 years of training). During the immersed training both models have precise enough approximation from 10-th to 70-th competitive round. Besides, all the data on sport results, starting from the very beginning of training, must be taken in the account during the process of modeling and forecasting of sport achievements. As we didn't make such observations (starting from the first year of training) in our research, we haven't succeeded in approximating of alterations of sport results during the period of time using sigmoid logistic function [14].

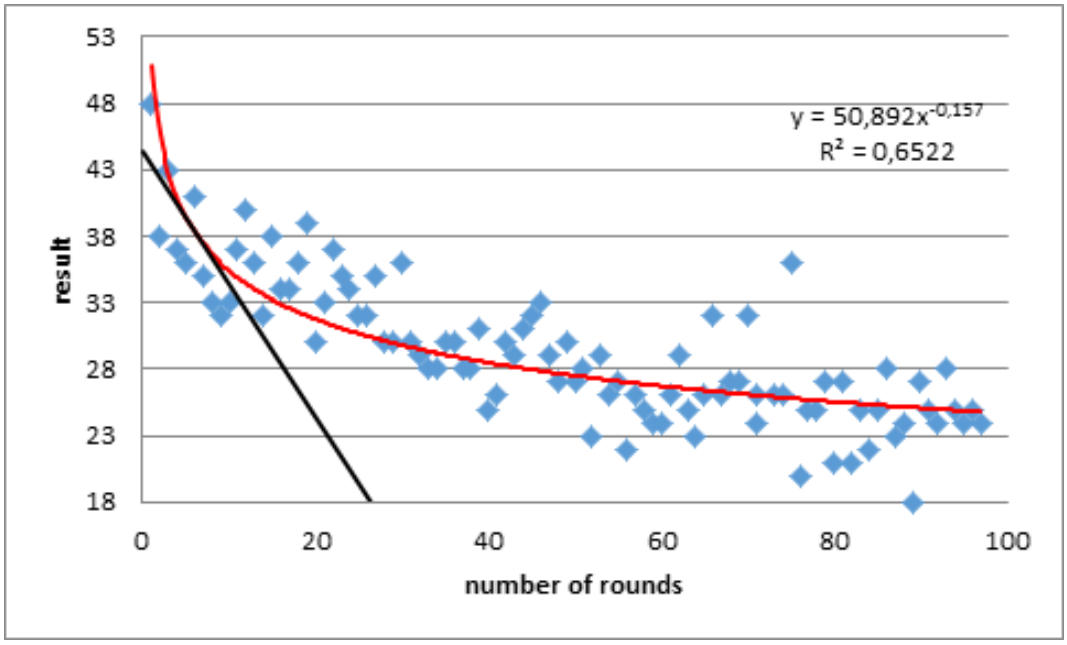


Figure 2. Location of criteria of scree on the graph of alteration of sport results

Offered models and criteria can be used for establishing of rated norms and forecasting of results in kinds of sport with primary demonstration of coordinating capabilities of accurate performance of purposeful motions.

**References:**

1. Goncharov V.I. One more time about the terms of “motional ability” and “motional skill” / Scientific notes of university of P.F. Lesgaft. 2008. №3. P. 30-33.
2. Goncharov V.I. Phenomenon of reproduction of motional skills / Scientific notes of university of P.F. Lesgaft. 2012. №7 (89). P. 39-43.
3. Gurskiy A.V. Recovery of motional skill of racers-luzhniki / Herald of sport news. 2013. №4. P. 20-22.
4. Kim J.-O., Muller C.U. “Factor analysis: statistical methods and practical questions” / digest of works “Factor, discriminant and clustered analysis”: translated from English; Edited by I.S. Enukov. M.: “Finances and statistics”, 1989. P. 215.
5. Korolkov A.N. Regularities of development of motional skill of junior mini-golf players / Physical education: upbringing, education, training. 2011. №6. P. 36-37.
6. Korolkov A.N. Different didactic features of assimilation of gaming actions in golf / Physical education: upbringing, education, training. 2012. №6. P. 40-43.
7. Korolkov A.N. Ratio of mastery and mass character in sports in the form of Pareto distribution / Scientific notes of university of P.F. Lesgaft. 2013. №2 (96). P.81-83.
8. Malceva D.D. Psycho-pedagogical factors of development of operational form of action / Herald of Moscow State Linguistical university. 2014. №7 (693). P. 109-117.
9. Nikitushkin V.G. Hirsch index of teachers in Moscow higher educational institutions in comparative evaluation of scientific efficiency of Russian sport higher educational institutions / V.G. Nikitushkin, G.N. Germanov, A.N. Korolkov // Theory and practice in physical education. 2015. №2. P. 94-97.
10. Nikitushkin V.G. Long-term training of junior sportsmen: monograph / V.G. Nikitushkin. – M.: Physical education, 2010. P.230: table

11. Plahtienko V.A. Different regularities of development of motional skill / Theory and practice in physical education. 1968. №12. P.10-13.

12. Sidneeva A.N. Development of writing skill by third type of orientation (modified method of N.S. Pantina) / Historically-cultural psychology. 2014. T. 10. №2. P.58-68.

13. Khudoley O.N. Regularities of development of motional skills of junior gymnasts / Science in Olympic sports. 2012. №1. P.36-46.

14. Mitchell, Tom M. Machine Learning. WCB-McGraw-Hill, 1997. ISBN 0-07-042807-7.


Published in the Russian Federation
European Journal of Physical Education and Sport
Has been issued since 2013.
ISSN: 2310-0133
E-ISSN: 2310-3434
Vol. 10, Is. 4, pp. 197-205, 2015

DOI: 10.13187/ejpe.2015.10.197
www.ejournal7.com

# Kinematic Analysis of the Effect of Rapid Weight Loss by Sauna on Elite Wrestlers' Single Leg Takedown Technique

[1] Amir Moghaddami
[2] Zinnur Gerek
[3] Ali Karimiasl
[4] Habib Nozohouri

[1-4] State university of Ataturk, Turkey
Institution of health science
Faculty of sport science
Corresponding author
PhD student Amir Moghaddami
E-mail: amir.moghaddami@yahoo.com

**Abstract**

Rapid weight loss and weight cutting are two widely used methods to reach competition weight; Sauna and dehydration as well as sweating through physical activity are very common. Many athletes with specific weight classifications such as wrestling, judo, and weight lifting want to participate in competitions 6-8 % below their normal weight. The aim of this study was to present an example of the quantitative contribution of modern sport biomechanics. The results showed that rapid weight loss could affect elite wrestlers 'performance techniques. These tests were performed in three, phases: pre-test (without dehydration), post-test1 (dehydration 3.5 %), and post-test2 (18 hours after rehydration). Thirteen experienced and elite wrestlers who had been training for 8 years participated as subjects (age 18.38 ±1.32yrs, height 1.70±0.04 m; body mass 71/111±11.80 kg). Reflective body markers attached all of the subjects' joints, and they performed single-leg takedown in front of three cameras (hero 3 @15fps/1440 p). 3D motion analyses method measured linear and angular kinematic characteristics were evaluated by Skillspector (1.3.2 version) software. Statistical analysis via the parametric and non-parametric Wilcoxon Rank-sum test and Repeated Measure test showed significant differences between the single-leg takedown techniques. The finding demonstrated negative effects on shoulders, pelvises, and knees linear max velocity, position, and angular max velocity.

**Keywords:** dehydration, 3D video analysis, velocity, position, angular velocity.

## Introduction

Wrestling is one of the Olympic sports and is popular around the world. So far, very little research has been done on the characteristics of the biomechanics of this sport. Biomechanics is the science that studies the structure and function of biological systems using laws and methods of mechanics, and the result of this science can be great help for athletes and coaches. Athletes have weight loss with different purposes such as participation in a lower weight class, achieving a state of perfect physical fitness, or increasing the level of sports performance. wrestling involve activities

such as pulling, pushing, squatting, squeezing, and twisting, and single-leg takedown technique is one of them. However, there is lack of scientific literature that examines the kinematic motions of the wrestling techniques bilaterally (Evans, 2013; wang G, liou H, 2011).

Wrestlers practice these weight loss techniques believing their chances of competitive success will increase; ironically; weight cutting may impair performance and endanger the wrestler's health. There are some facts indicating that the performance of complex tasks, such as those involved in many teams, is also ruined at dependently low levels of fluid shortage. Most of the researches have shown impaired dehydration power, strength, balance (static and dynamic), endurance, and vital functions (Brausch, 2011; Lambert & Jones, 2010; Pettersson & Berg, 2014; Sagayama et al., 2014; Savoie, Kenefick, Ely, Cheuvront, & Goulet, 2015).

Proving the negative effects of weight cutting in the implementation techniques of sports is an important factor in athletic performance and injury prevention, especially in wrestling. By investigation, the effects of dehydration on the biomechanical parameters can be a deterrent to prevent dehydration among the wrestlers. A three-dimensional analysis has to be done for rotating or more complex movements, such as wrestling, judo, soccer, gymnastic etc. Therefore 3D motion analysis requires at least two cameras. Most movements require four or more cameras. This study used three cameras, calibration frames, and body markers to analyze single-leg takedown technique (Barbas et al., 2011; Franchini, Brito, & Artioli, 2012; Goulet, 2011; Imamura, Hreljac, Escamilla, & Edwards, 2006; Rita S, 2006).

During a match, besides the ability to act a technique such as single-leg takedown skill, dehydration may impair performance in wrestlers and defeat may be the result. By studying the kinematics of the single-leg takedown technique, as well as the differences between execution by guards and non-guards limbs, coaches and athletes will gather very useful information. The information will result in technique effectiveness in matches and a reduction of dehydration method. We can measure the joints and segments of linear kinematics such as velocity, position, acceleration before dehydration, and after rehydration and angular parameters (Imamura et al., 2006; Payton, Bartlett, & British Association of Sport and Exercise Sciences., 2007; Roger, 2007; Shan & Zhang, 2011).

**Method**

1. Methodology: researchers used the experimental and laboratory method by selecting two groups, sauna group, and active group.

2. The research sample:

Thirteen male elite wrestlers were recruited from YOL SPOR| gym, to participate in this study, they were in training camp. The mean age, height, and weight were 18.38 ±1.32 yrs, 1.70±0.04 m, and 71/111±11.80 kg, respectively. All participants were free of injury or illness, and they used their guard side of their body as their dominant side and the unguarded side as their non-dominant side. The experimental protocol was performed in accordance with the Declaration of Helsinki for human experimentation and was approved by the university of Ataturk ethical committee. The subjects from the gym read and signed the informed consent form.

3. Measurements

All subjects participated in a pre-test, and a first and second post-test and did a single leg takedown technique 3 times, and all of the movements were done without a competitor. Implementation of techniques is very common among wrestlers. The experimental group sat in the sauna three times for a period of 60 min. (3×20 min) and submitted their weight variations. Calibration cube, high-speed camera, and reflective markers were used for video analysis. The authors at university built calibration cube. Reflective joint markers were placed on both sides of the body at (right/left acromion, Lateral epicondyle of the humerus, wrist-ulna, ASIS, knee, ankle, toe must be parallel with heel marker). Video recording was done with high-speed digital camera hero three@15fps/1440 p; Skillspector (Version 1.3.2) software was used for 3D video analysis. Full body model with 14 points was used for calculating kinematic parameter of movements. The following measurements were taken: linear and angular kinematic (points velocity, position, angular velocity). Data smoothing was done with the help of frequency filter.

4. Procedure

Testing was carried out in the YOL SPOR gym in Turkey/Erzurum with in a 2-day period, starting at 14:00 o'clock up to20:00 under the following environmental condition: average

temperature 25°C (minimum 23, maximum 27), and sauna temperature was 60-70°C. The cameras and calibration cube were fixed on the wrestling mats and were synchronized with each other. First camera was placed in front at 2.30m, and the second and third cameras were placed sideways at 3m from the calibrated place on the mat; subjects voided their bladder as completely as possible, and nude body weight and body composition were measured (Tanita, TBF-300A Body Composition analyzer, Japan, weighing accuracy of ±10g). Subjects participated in pre-test before dehydration. Weight cutting procedures were tested on three occasions: 1) before sauna, 2) after three consecutive sauna sessions (3 × 20 min at 60-70 °C, with 5 min rest interval), and 3) after 18 hours rehydration period. Rehydration period was performed according to wrestling rules, meaning that weight measuring was done one day before the matches. Rehydration period was controlled by the authors based on the amount of the use of food and water package. Wrestlers done single-leg takedown technique for three times; all movements were performed at maximum physical effort.

5. Statistical Analysis

The data are reported as mean ± standard deviation. We have measured each factor three times, so the average of this information was used as evidence. The normal distribution of data was determined by k-s test. The parametric and non-parametric tests such As Repeated Measures and Friedman were performed to compare the variables between pre-test and post-tests. The researchers in this study had an independent sauna group with three tests (pre-test, first post-test, and second post-test 18 hour after dehydration). The relationships between tests were compared by repeated measures test. Statistical analysis was performed by IBM SPSS version 21.

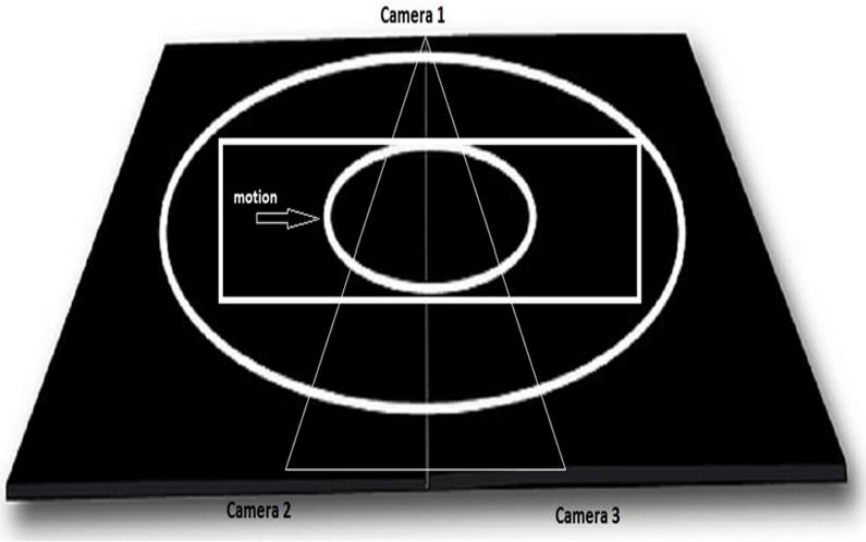


Figure 1. Shows that Position of cameras and calibration cube during tests

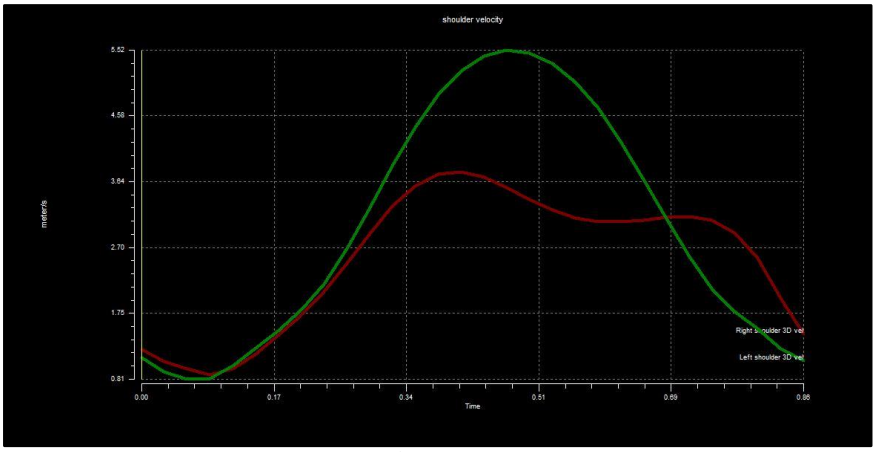


Figure 1a

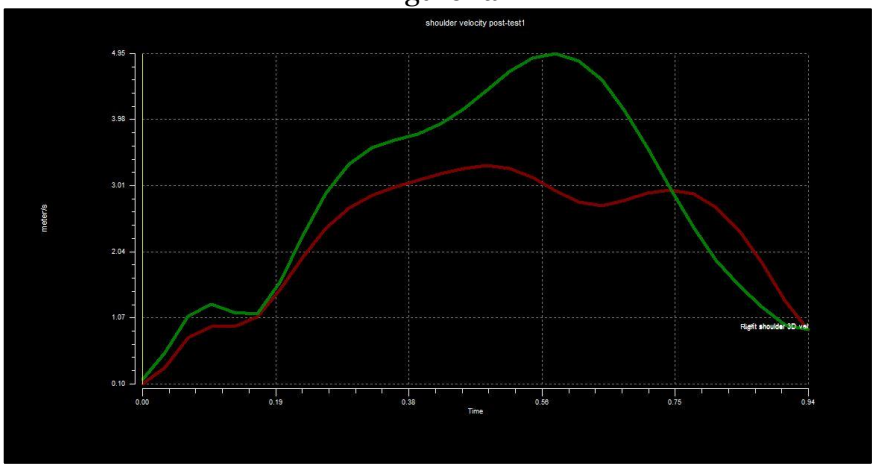


Figure 2b

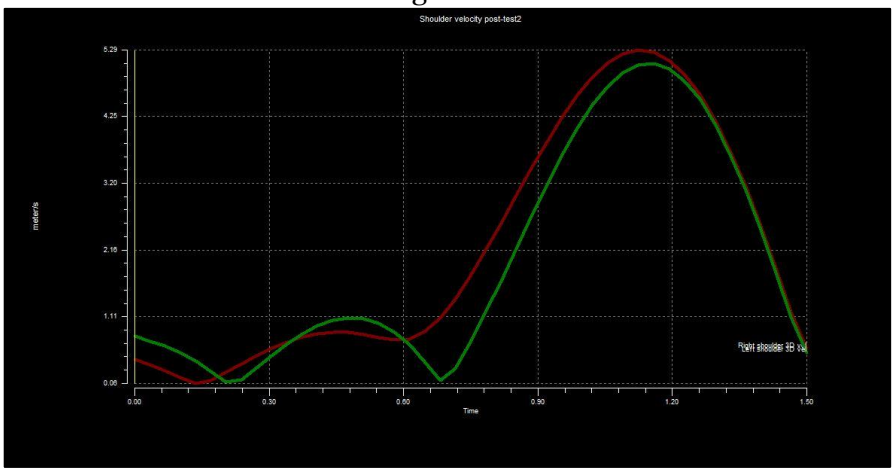


Figure 2c

Figure 2

Figure 2. shows that Variation of the shoulder linear velocity during pre-test and post-tests, (Fig.2a) Left and right shoulder velocity in pre-test, (Fig.2b) Left and right shoulder velocity in post-test1, (Fig.2c) Left and right shoulder velocity in post-test 2

**Results**

Body compositions were measured between tests. The body weight was 71.111±11.801 in pre-test time and 68.034±11.410 in post-test1 after dehydration and 70.205±11.902 in post-test2 after rehydration. This represented a mean dehydration of 2.84±0.34 kg. Water replacement during

rehydration was 2.170±1.254 kg the results of which are given in table 1. The results of kinematic parameters, a statistical analysis of variables showed that acute dehydration impact, right and left shoulder velocity decrease significantly (p<0.52) (p<0.27), position points decreased in post-test1 and post-test2 (p<0.001); right and left pelvis velocity and position points decreased in post-test1 and post-test2 (p<0.001). Right trunk segment's angular velocity was affected in post-test1 and post-test2 (p<0.001); left trunks segment's angular velocity was impaired in post-test1 and post-test2 (p<0.025). Right knee point velocity decreased in post-tests (p<0.006), and left knee point velocity and right, left points position are impaired in post-tests (p<0.001). Right and left thigh segments decreased in post-test1 and 2 (p<0.001) (p<0.004).

Table 1: Descriptive statistics of wrestlers' body composition changes during tests

| | N | Mean | Std. Deviation |
|---|---|---|---|
| Age | 13 | 18.3846 | 1.325 |
| body height m | 13 | 1.7008 | .0469 |
| Weight pre-test (kg) | 13 | 71.111 | 11.801 |
| Weight post-test1 (kg) | 13 | 68.034 | 11.410 |
| Weight.post-test2 (kg) | 13 | 70.205 | 11.902 |
| Fat pre-test % | 13 | 4.923 | 1.397 |
| Fat post-test1 % | 13 | 4.860 | 1.411 |
| Fat.post-test2 % | 13 | 4.815 | 1.352 |
| Fat mass pre-test (kg) | 13 | 3.384 | 1.215 |
| Fat mass post-test1(kg) | 13 | 3.324 | 1.201 |
| Fat mass post-test2(kg) | 13 | 3.312 | 1.255 |
| Fat free mass pre-test (kg) | 13 | 64.188 | 8.522 |
| Fat free mass post-test1 (kg) | 13 | 60.041 | 9.269 |
| Fat free mass.post-test2 (kg) | 13 | 60.735 | 9.367 |
| Total body water pre-test (kg) | 13 | 45.949 | 6.361 |
| Total body water.post-test1 (kg) | 13 | 43.246 | 5.986 |
| Total body water.post-test2 (kg) | 13 | 45.274 | 6.267 |

Table 2: all points and segments' repeated measure results during tests

| Variables | | Mean | SD | N | F | df | Sig |
|---|---|---|---|---|---|---|---|
| Right shoulder velocity (m/s) | Pre-test | 4.3138 | .55216 | 13 | 3.359 | 2 | .052* |
| | Post-test1 | 4.2215 | .52508 | 13 | | | |
| | Post-test2 | 4.3238 | .53167 | 13 | | | |
| Left shoulder velocity (m/s) | Pre-test | 4.6917 | .52286 | 13 | 4.256 | 2 | .027* |
| | Post-test1 | 4.6175 | .55852 | 13 | | | |
| | Post-test2 | 4.7025 | .54526 | 13 | | | |
| Right shoulder position (m) | Pre-test | 2.5615 | .08905 | 13 | 39.969 | 2 | .001* |
| | Post-test1 | 2.4515 | .07069 | 13 | | | |
| | Post-test2 | 2.4792 | .06994 | 13 | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Left shoulder position (m) | Pre-test | 2.7192 | .10372 | 13 | 45.074 | 2 | .001* |
| | Post-test1 | 2.6177 | .10895 | 13 | | | |
| | Post-test2 | 2.6385 | .10148 | 13 | | | |
| Right pelvis velocity (m/s) | Pre-test | 5.4277 | 1.04917 | 13 | 14.047 | 2 | .001* |
| | Post-test1 | 4.6038 | .74185 | 13 | | | |
| | Post-test2 | 4.6338 | .74942 | 13 | | | |
| Left pelvis velocity (m/s) | Pre-test | 6.7362 | .93830 | 13 | 92.746 | 2 | .001* |
| | Post-test1 | 5.3023 | .79955 | 13 | | | |
| | Post-test2 | 5.3154 | .78569 | 13 | | | |
| Right pelvis position (m) | Pre-test | 2.4446 | .05364 | 13 | 56.069 | 2 | .001* |
| | Post-test1 | 2.3738 | .05752 | 13 | | | |
| | Post-test2 | 2.3931 | .05808 | 13 | | | |
| Left pelvis position (m) | Pre-test | 2.7177 | .03395 | 13 | 26.490 | 2 | .001* |
| | Post-test1 | 2.6431 | .05298 | 13 | | | |
| | Post-test2 | 2.6577 | .04206 | 13 | | | |
| Rıght trunk angular velocıty (deg/s) | Pre-test | 412.2400 | 6.13343 | 13 | 283.289 | 2 | .001* |
| | Post-test1 | 361.0577 | 11.86545 | 13 | | | |
| | Post-test2 | 366.0577 | 13.89714 | 13 | | | |
| Left trunk angular velocıty (deg/s) | Pre-test | 440.6985 | 6.17422 | 13 | 4.301 | 2 | .025* |
| | Post-test1 | 432.9600 | 7.98980 | 13 | | | |
| | Post-test2 | 433.8692 | 7.81831 | 13 | | | |
| Right knee velocity (m/s) | Pre-test | 4.2231 | .56587 | 13 | 6.291 | 2 | .006* |
| | Post-test1 | 3.5754 | .63478 | 13 | | | |
| | Post-test2 | 3.5431 | .61703 | 13 | | | |
| Left knee velocity (m/s) | Pre-test | 7.1277 | .58260 | 13 | 216.069 | 2 | .001* |
| | Post-test1 | 5.6138 | .66391 | 13 | | | |
| | Post-test2 | 5.7200 | .69714 | 13 | | | |
| Right knee position (m) | Pre-test | 2.6977 | .07704 | 13 | 32.966 | 2 | .001* |
| | Post-test1 | 2.6023 | .05215 | 13 | | | |
| | Post-test2 | 2.6146 | .04095 | 13 | | | |
| Left knee posıtıon (m) | Pre-test | 2.1992 | .04232 | 13 | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Post-test1 | 2.1192 | .04291 | 13 | 50.787 | 2 | .001* |
| | Post-test2 | 2.1338 | .04646 | 13 | | | |
| Right thigh segment angular velocity (deg/s) | Pre-test | 326.2100 | 7.64211 | 13 | 377.893 | 2 | .001* |
| | Post-test1 | 276.4962 | 8.38864 | 13 | | | |
| | Post-test2 | 282.5731 | 9.34569 | 13 | | | |
| Left thigh segment angular velocity (deg/s) | Pre-test | 647.3000 | 24.14199 | 13 | 77.343 | 2 | .004* |
| | Post-test1 | 555.1685 | 35.47310 | 13 | | | |
| | Post-test2 | 540.0769 | 17.45317 | 13 | | | |

Significant at $p \leq 0.005$

**Discussion**

There are three important biomechanical patterns to do wrestling: joints velocity, joints position, and segments angular velocity. The main aim of the study was determining the effect of dehydration by passive method in the ability of wrestler in performing a technique and the effects of weight cutting on joints and body biomechanical patterns. Literature on the effects of dehydration and rehydration on the biomechanical parameters does not exist. Therefore, this is the first study to investigate the effects of dehydration on biomechanical parameters, and this is the first on the biomechanical patterns among the wrestlers(WANG G et al., 2011).

The results show that the biomechanical segments and points studied in this research , due to the rapid weight loss, had a sharp decline in both sides of wrestlers' body ($p<0.001$); data showed linear velocity in shoulder, pelvis and knee decreases strongly ($p<0.001$). These results were in accordance with those of Evans and Paterson (Pettersson & Berg, 2014).

This difference of joints' linear velocity and position in dehydration and rehydration times could be explained by the short time motion tests, mean, and peak power. Time is the most important component of power, so we could say if the short time motion such as performing a technique decreases in a special condition, power, strength and muscle performance will decrease too. There are many studies showing that most patterns of physical fitness are affected by rapid weight loss. Isometric handgrip strength and back strength decreased, and muscle performance, especially dynamic postural control, changed after weight cutting. Wingate performance and mean jump height showed similar decline after fluid restriction between the post-tests (B, DM, J, & JR, 2004; Brausch, 2011; Murray, 2007).

The results of the power data as the most commonly used scale to measure performance are closely related with motion biomechanics, and many studies have used power data to determine the effects of acute dehydration on athletic performance. Mean power, peak power, max anaerobic power, and total power in upper and lower body show significant decrease in some studies after weight cutting (Kraft et al, 2012; Hayes and Morse, 2010). Our results aligned with the results of these studies, mean left and right shoulder velocity ($p<0.001$), right and left pelvis ($p<0.001$), right and left knee velocity ($p<0.006$, $p<0.001$) significantly decrease in post-test1 and post-test2. These results showed the wrestlers' technique performance was slower in post-test1 and post-test2 than pre-test.

Most studies showed the deficit effect of dehydration on anaerobic performance than aerobic performance. Wrestling is an anaerobic sport, and all techniques have to be done in short time rapidly; power, speed, balance, coordination, and strength are the main components to the implementation of techniques in wrestling and other atrial sports. The negative effect in biomechanical parameters can be discussed by anaerobic performance component. So decrease in reaction time and central reaction time in martial arts showed biomechanical parameters decreased by dehydration, and our study confirmed the results of the study by (Evans, 2013; Jones, Cleary, Lopez, Zuri, & Lopez, 2008; Lambert & Jones, 2010; Maughan & Shirreffs, 2010).

Our finding suggests that18 hour's rehydration time was not enough to recover performance. Mean linear velocity, position, and angular velocity in post-test2 decreased compared with pre-test. Rehydration period for 24 hours is not enough to recovery and performance before weight cutting function, central reaction time, and muscular power (Franchini et al., 2012; Kordi, Ziaee, Rostami, & Wallace, 2011). Dehydration by 5% of body weight strongly reduced the repetitions during strength training period, and our study with 3.5-4% dehydration amounts showed biomechanical defected. Hypohydration impaired overall muscle endurance in upper and lower body; anaerobic power altered with Hypohydration, but anaerobic capacity and vertical jumping ability did not (Jones et al., 2008; Savoie et al., 2015; V, P, J, M, & E, 2007).

Overall, the findings of this study indicate that dehydration through saunas has negative effect on the biomechanical parameters, linear velocity and angular velocity, and position of shoulders, hips, and knees joints in wrestlers during a single takedown technique will drop. Therefore, it is recommended to athletes and coaches to avoid weight cutting specially using a sauna.

**References:**

1. Wang G, Liou H, P. L. Biomechanical analysis of hold-throw technique in elite wrestler. International Journal of Wrestling Science. 2011.

2. Evans JS. Weight cutting: A biomechanical investigation of the effect on martial arts striking performance [M.Sc.]. Ann Arbor: University of Lethbridge (Canada); 2013.

3. Pettersson S, Berg CM. Hydration status in elite wrestlers, judokas, boxers, and taekwondo athletes on competition day. International journal of sport nutrition and exercise metabolism. 2014;24(3):267-75.

4. Brausch JM. Does Hydration Status Have An Effect on Wrestling Performance in High School Wrestlers? [M.S.]. Ann Arbor: West Virginia University; 2011.

5. Lambert C, Jones B. Alternatives to rapid weight loss in US wrestling. International journal of sports medicine. 2010;31(8):523-8.

6. Savoie FA, Kenefick RW, Ely BR, Cheuvront SN, Goulet ED. Effect of Hypohydration on Muscle Endurance, Strength, Anaerobic Power and Capacity and Vertical Jumping Ability: A Meta-Analysis. Sports medicine. 2015.

7. Sagayama H, Yoshimura E, Yamada Y, Ichikawa M, Ebine N, Higaki Y, et al. Effects of rapid weight loss and regain on body composition and energy expenditure. Applied physiology, nutrition, and metabolism = Physiologie appliquee, nutrition et metabolisme. 2014;39(1):21-7.

8. Imamura RT, Hreljac A, Escamilla RF, Edwards WB. A three-dimensional analysis of the center of mass for three different judo throwing techniques. Journal of sports science & medicine. 2006;5(CSSI):122-31.

9. Rita S SF, Angelo C. *Biomechanics Of Human Movement*. Rome: Department Of Human Movement And Sport Sciences; 2006. p. 62.

10. Barbas I, Aggeloussis N, Podlivaev B, Shakhmuradov Y, Mirzaei B, Tunnemann H, et al. Biomechanical protocol to assist the training of arm-throw wrestling technique. *International Journal of Wrestling Science*. 2011;2.

11. Franchini E, Brito CJ, Artioli GG. Weight loss in combat sports: physiological, psychological and performance effects. J Int Soc Sports Nutr. 2012;9(1):52.

12. Goulet ED. Effect of exercise-induced dehydration on time-trial exercise performance: a meta-analysis. British journal of sports medicine. 2011;45(14):1149-56.

13. Shan G, Zhang X. From 2D leg kinematics to 3D full-body biomechanics-the past, present and future of scientific analysis of maximal instep kick in soccer. Sports medicine, arthroscopy, rehabilitation, therapy & technology : SMARTT. 2011;3(1):23.

14. Roger B. *Introduction To Sports Biomechanics Analysing Human Movement Patterns*. USA, Canada: Routledge 270 Madison Avenue, New York, NY 10016; 2007.

15. Payton C, Bartlett R, British Association of Sport and Exercise Sciences. Biomechanical evaluation of movement in sport and exercise : the British Association of Sport and Exercise Sciences guide. Abingdon, Oxon ; New York, NY: Routledge; 2007. p. p.

16. Murray B. Hydration and physical performance. Journal of the American College of Nutrition. 2007;26(5 Suppl):542S-8S.

17. B A, DM L, J C, JR S. Factors related to rapid weight loss practices among international-style wrestlers. Medicine and science in sports and exercise. 2004;36(2):249-52.

18. Maughan RJ, Shirreffs SM. Dehydration and rehydration in competative sport. Scand J Med Sci Sports. 2010;20 Suppl 3:40-7.

19. Jones LC, Cleary MA, Lopez RM, Zuri RE, Lopez R. Active dehydration impairs upper and lower body anaerobic muscular power. Journal of strength and conditioning research / National Strength & Conditioning Association. 2008;22(2):455-63.

20. Kordi R, Ziaee V, Rostami M, Wallace WA. Patterns of weight loss and supplement consumption of male wrestlers in Tehran. Sports medicine, arthroscopy, rehabilitation, therapy & technology : SMARTT. 2011;3(1):4.

21. V PA, P MJ, J NA, M GK, E PW. Neuropsychological performance, postural stability, and symptoms after dehydration. Journal of athletic training. 2007;42(1):66-75.

Published in the Russian Federation
European Journal of Physical Education and Sport
Has been issued since 2013.
ISSN: 2310-0133
E-ISSN: 2310-3434
Vol. 10, Is. 4, pp. 206-211, 2015

DOI: 10.13187/ejpe.2015.10.206
www.ejournal7.com


# Comparative Study on Selected Physical Fitness and Physiological Variables Between Volleyball and Handball Players

Harneet Singh

Physical Education at Sri Guru Granth Sahib World University, Fatehgarh Sahib, India
Assistant Professor

**Abstract**

The purpose of the study was Compare the selected Physical fitness and Physiological variables between Volleyball and Handball players. Thirty players of handball and Volleyball represented their university in the Inter University tournament during 2011-2012 session from Patiala district were selected as subjects, their age ranged from 17 to 28. The study was an experimental research, the selected physical fitness and physiological variables such as flexibility, endurance, agility, explosive strength, heart rate, vital capacity, and cardiovascular endurance were measured. Analysis of Data 't' test were applied to check the significant difference between the group. There was significant difference between physical i.e. flexibility and explosive strength & physiology variables and there was no significant difference between physical variables i.e. Endurance and agility. Conclusion: it was concluded that there was a significant difference in some selected physical & physiological variables i.e. flexibility, explosive strength & endurance, agility and this type of study need to replicate in variety of players, both male and female or different level of age group, and higher level like national level, taking a large number of subjects.

**Keywords:** flexibility, endurance, agility, explosive strength, heart rate, vital capacity and cardiovascular endurance.

## Introduction

Sport is one of the avenues of man's never ceasing strive for excellence. Its uniqueness lies in the intimacy between the physical happenings of human bodies and their repercussions on their minds as well as in the general reconcilability of the social and aesthetic values which sport engenders. Sport evokes experiences that are exclusively human and independent of the changing forms, patterns and customs of a civilization which involves profoundly modifying concepts of our environment.

According to Clarke, H. Harrison (1976) in a society where materials values predominates, participation solely for pleasure, recreation and allied benefits in any activity such as sports, that demands much time, energy and self-discipline is not likely to be very popular or widely practiced doctrine, especially when the nations of the world are openly using sports as an approach to national fitness and International prestige.

| Physical/ physiological variables | Objective | Apparatus Used | Test Description | Scoring |
|---|---|---|---|---|
| Flexibility | To measure the flexibility of the performer in forward bending position | Wooden Box (40'×20'×15'), measuring tape. | The performer stand on the box and then start forward bending without knee bending and touch the front side of the box. | The distance taken in Centimeter. |
| Endurance | To measure the endurance | Athletics' track, measuring tape, stop watch, clapper. | 12 minute run/walk was to test the endurance of subjects. Subjects were allowed to warm up before actual performance. On the signal "On your mark and go" the subjects run/walk as possible for 12 minutes. | Distance to the nearest meter was taken and recorded Endurance (12 minute run/walk) |
| Agility | To measure the agility of the performer in running and changing direction | Measuring tape, stop watch, two wooden blocks (2"×2"×4") | The performer starts behind the starting line on the single go and runs to the blocks, pickup one return to the starting line and places the block behind the line. He then repeats the process with the second block. | The time taken to shuttle run race and recorded to the nearest 1/10 of a meter |
| Explosive strength | To measure the explosive strength. | Marked Wall, Measuring tape, chalk powder | Subject was stand laterally and swings his arm backward and goes downward and then jumps vertically and touching the wall by the tip of the middle finger. | Scoring was done in centimeter of distance from the normal height to the nearest contact point on the wall |

| | | | | |
|---|---|---|---|---|
| Heart rate | To measure the pulse count | Stop watch, chair | The subject sitting on the chair in easy condition and radial pulse is counted by the evaluator in 1 minute. | Total pulse is counted in 1 minute. |
| Vital capacity | Determination of vital capacity | Dry spirometer, chair, nose clips. | The vital capacity of the subject was determined by the dry spirometer in sitting position. The subject was allowed to inspire the maximum amount of air voluntarily and then he was asked to blow into the dry spirometer to the maximum extent. While taking the test the nose of the subject was clipped using a nose clip | The vital capacity of the subject was obtained from the movement of the circular volume indicator which was set at 'o' before the vital capacity measure was taken. The result was calculated in liter |
| Cardiovascular endurance | To measure the cardiovascular endurance | 18" high platform, stop watch, chairs. . | The subjects were in their P.T. dresses with canvas rubber soled shoes. They stepped on a 18" high platform, stepping 24 times per minute. The rate was set by metro norm, under the careful guidance of evaluator. Endurance was restricted to 3 minutes (180 seconds). At the most recovery heart rate was recorded from 0.1 to 1.5 minutes | |

'Fitness' and 'training' are the most misused and over-used words in English language. Sir roger Bannister defined "Physical fitness" as a state of mental and physical harmony which enables someone to carry on his occupation to the best of his ability with the greatest happiness. Bemergee A. Richard (1982) mentioned that fitness for sports and work has an absolute and a relative meaning in absolute terms, the man that can run the fastest, Jump the highest output during a working day, must be the fit for the particular activity.

**Material & methods**

Data were collected on two groups of 15 Volleyball and 15 Handball players from Patiala district and those who had represented their university in the Inter University tournament during 2011-2012 sessions were selected as subjects, their age ranged from 17 to 28.

**Procedure for administrating test**

The physical and physiological tests were performed in the ground of Punjabi University, Patiala. The following test were administered,

**Statistical Analysis**

't' test was applied to check the significant difference between the group. The levels of significance were set at 0.05 level of Physical and Physiological variables of Volleyball and Handball Players is presented in table 1, 2, 3 and 4.

**Results**

Table 1: Mean and SD of Physical Variables of Handball and Volleyball Players

| S. No. | Variables | Volleyball | | Handball Player | |
|---|---|---|---|---|---|
| | | Mean | SD | Mean | SD |
| 1. | Flexibility | 16.6 | 5.21 | 20.5 | 5.04 |
| 2. | Endurance | 2.331 | 263 | 2.276 | 408 |
| 3. | Agility | 19.8 | 18.0 | 15.1 | 6.00 |
| 4. | Explosive Strength | 48.7 | 9.96 | 40.5 | 8.47 |

It is evident from the table I that the mean of volleyball players in the Physical variable i.e., flexibility, endurance agility and explosive strength are 16.6(C.M.) for flexibility, 2.331(m) for endurance, 19.8 (Sec) for agility and 48.7 (C.M.) for explosive strength and in the case of Handball players for the physical variables i.e., flexibility, endurance, agility and explosive strength are 20.5 (C.M.) for flexibility, 2.276 (m.) for endurance, 15.1 (Sec) for agility and 40.5 (C.M.) for explosive strength.

Table 2: Mean and SD of Physiological Variables of Volleyball and Handball Players

| S. No. | Variables | Volleyball | | Athletic Player | |
|---|---|---|---|---|---|
| | | Mean | SD | Mean | SD |
| 1. | Heart Rate | 72.9 | 9.19 | 58.9 | 5.31 |
| 2. | Vital Capacity | 2.985 | 442.0 | 3.406 | 498 |
| 3. | Cardiovascular Endurance | 72.2 | 9.81 | 64.5 | 5.00 |

It is evident from the table 2 that mean of volleyball players in the physiological variable i.e., Heart Rate, vital Capacity and cardiovascular endurance are 72.2 (beat) for cardiovascular endurance, 72.9 (mm) for Heart Rate and 2.985 for vital capacity and in the case of Handball for the variable physiological i.e., Heart Rate, vital capacity and cardiovascular endurance are 58.9 (beat) for Heart Rate, 3.406 (mm) for vital capacity and 64.5 (Sec) for cardiovascular endurance.

Table 3: Significance of Differences of Mean in Selected Physiological Variables of Volleyball and Handball Players

| S. No. | Variables | Mean Differences | 't'- ratio |
|---|---|---|---|
| 1. | Flexibility | 3.9 | 2.90* |
| 2. | Endurance | 0.155 | 0.628 |
| 3. | Agility | 4.7 | 1.37 |
| 4. | Explosive Strength | 8.2 | 3.44* |

*Significant at 0.05 level of confidence

Table 4: Significance of Differences of Mean in Selected Physiological Variables between Volleyball and Handball Players

| S. No. | Variables | Mean Differences | 't'- ratio |
|---|---|---|---|
| 1. | Heart Rate | 14.0 | 2.06* |
| 2. | Vital Capacity | 0.475 | 3.90* |
| 3. | Cardiovascular Endurance | 7.7 | 3.86* |

*Significant at 0.05 level of confidence.

**Conclusion**

Within the limitation of the study and procedure following conclusion were arrived at: There was significant difference between volleyball and Handball players in physical variables i.e. flexibility and explosive strength. There was no significant difference between volleyball and athletic players in physical variables i.e. Endurance and agility. There was significant difference between volleyball and Handball players in physiological variables i.e. heart rate, vital capacity and cardiovascular endurance.

**References:**

1. Bemergee, A.R. (1982). Applied Exercise Physiological", Philadelphia: La and Fibiger Publication, 210.
2. Cab, D. (1968). Comparison of physical over a four year period at University of North Dakota" Research quarterly 10, 9.
3. Carl, E.H. (1968). A comparison of the physical fitness level attained by participants in inter- scholastic athletics and in the required physical education programme. Completed research in health, physical education recreation 10, 65.
4. Clarke, H.H. (1976). Application of Measurement to Health and Physical Education Englewood Cliff. N.J. Printice Hall I.N.C.
5. Clarke, D.H., & Clarke, H.H. Research process in Physical education Recreation and Health", Prentice Hall, I.N.C. Englewood Cliffs, New Jersey, 267.
6. Kansal, Devinder K. (1996). Test and Measurement in Sports and Physical Education. D.V.S. New Delhi.

7. Mouelhi Guizani S, Tenenbaum G, Bouzaouach I, Ben Kheder A, Feki Y, Bouaziz M.(2006). Information-processing under incremental levels of physical loads: comparing racquet to combat sports. J Sports Med Phys Fitness. 46(2):335-43.

8. Tsolakis Ch, Kostaki E, Vagenas G. (2010). Anthropometric, flexibility, strength – power and sport specific correlates in elite fencing. Perc Mot Skills, 110: 1-14.

9. Verma J. Parkash. (2000). A text book of sports statistics. Venus publiciation.


Published in the Russian Federation
European Journal of Physical Education and Sport
Has been issued since 2013.
ISSN: 2310-0133
E-ISSN: 2310-3434
Vol. 10, Is. 4, pp. 212-219, 2015

DOI: 10.13187/ejpe.2015.10.212
www.ejournal7.com

# Goal Orientation Profile Differences in Greek Physical Domain

[1] Ioannis Proios
[2] Athanasios Siropoulos
[3] Miltiadis Proios

[1,3] Department of Physical Education and Sport Sciences
Aristotle University of Thessaloniki, Greece
[2] Department of Physical Education and Sport Sciences
Democritus University of Thrace, Greece
E-mail: mproios@phed.auth.gr

**Abstract**

The purpose of this study was to determine the individual differences on goal perspectives in the sport domain. The participants in the study consisted of 360 athletes (football, handball, basketball, track and field, volleyball, rowing, gymnastics, etc), 147 referees, and 79 physical education and exercise (391 males and 185 females), ranging in age from 13 to 50 years ($M$ = 22.54, $SD$ = 7.70). Their experience varied from 1 to 32 years ($M$ = 6.27, $SD$ = 5.24). All subjects filled in two versions of Task and Ego Orientation in Sport Questionnaire (TEOSQ and TEOSQ-R). The results were found achievement goal profile differences for all variables except gender. Overall, the findings support achievement goal frameworks and suggest that further examination of dispositional achievement goals may afford a deeper understanding of social relationships and motivational processes in achievement domains.

**Keywords:** goal orientation, age, experiences, gender, form of participation, type of sport.

According to the achievement goal theory the individual is an intentional, goal-directed organism operating in a rational manner. In this theory, in achievement domains such as sport, two classes of goals predominate, namely task/mastery and ego/performance goals, respectively (Ames & Archer, 1988; Nicholls, 1989). Mastery goals are focused on the development of competence through task-mastery, whereas performance goals are focused on the demonstration of competence relative to others.

Apart from the above mentioned dichotomous achievement goal framework, Elliot and her colleagues (e.g., Elliot, 1999; Elliot & Church, 1997; Elliot & Harachiewicz, 1996) have proposed a trichotomous achievement goal perspective. According to the trichtomous goals and 2x2 perspectives, mastery and performance goals are divided into approach and avoidance components (Elliot, 1999). However, most studies on achievement goals and general affect have used the dichotomous model of goals and worked under the assumption that mastery goals are beneficial to, and performance goals detrimental for, athletes' affective experience (see reviews in Linnenbrink & Pintrich, 2002; Pekrun, Elliot, & Maier, 2006).

According to Nicholls (1989) a person can be more task or more ego orientated at a specific moment and this has to do with developmental differences. Nicholls (1978) supported that

"younger children are naturally task orientated until they acquire a mature understanding of ability, because they are incapable of employing a more differentiated conception of ability. In contrast, adolescents and adults can evoke a more or less task- or ego-orientated behavior" (p. 332). Nicholls (1992) also suggested that children's levels of reasoning about developmental concepts (e.g., effort, ability, luck and task difficulty) would be considered across achievement domains, such as sport and school (Fry & Duda, 1997, p. 332).

In the achievement domain has supported that exist individual differences in dispositional goal orientation (Nicholls, 1992). Research in the physical domain has provided support for these theoretical proposition (see Chameton & Duda, 1988; Duda, 1987, 1988, 1989a, 1989b; Treasure & Roberts, 1994; Tuffey, 2001; White & Duda, 1994; Williams & Gill, 1995). The findings have generally shown that males tend to be more ego orientated than females and that females tend to more task orientated than males. Children of approximately 9 to 11 years of age tend to emphasize task-involved goals in sport whereas young adolescents of 12 to 14 years of age were more likely to be ego involved. More experienced athletes demonstrated significantly higher ego goal orientation that less experienced athletes. Ego orientation in sport situations takes over more and more with the increase of competitiveness. Students who were currently involved in sports (recreational and/or interscholastic) placed a greater emphasis on task involved success than the students who had dropped or had never been involved in the athletic domain.

People participate in sport in various ways, as athletes in school activities or teams, as referees or as coaches. This provides each and every one of these people with a different perception of the concept of ability that will lead them to the achievement of a goal. White and Duda (1994) reported that athletes of a high competitive level were significantly ego orientated than their adult counterparts who participated in recreational activities or athletes at a lower level of sport involved. There is certainly a differentiation on how a goal is achieved when people participate in sports differently. Furthermore, on sport there are different types of sports (e.g., contact or no contact, team or individual).

The purpose of this study was to determine if dispositional achievement goal orientation profiles that are reported in the literature would be observed in three Greek samples (athletes, referees, and physical education and exercise). We hypothesized that achievement goal orientation profiles that are consistent with those reported in the literature would emerge and that these profiles would reflect differing perceptions of the sport social environment.

## Method

*Participants*

The participants in the study consisted of 360 athletes (football, handball, basketball, track and field, volleyball, rowing, gymnastics, etc), 147 referees, and 79 physical education and exercise (391 males and 185 females), ranging in age from 13 to 50 years ($M$ = 22.54, $SD$ = 7.70). Their experience varied from 1 to 32 years ($M$ = 6.27, $SD$ = 5.24).

The variables of age and experience were divided in levels. Age levels were drawn out according to the education levels of subjects and were as follows: First level 13-18 years, second level 19-23, third level 24-27, fourth level 28 to 35 and fifth 36 to 50. Experience levels were as follows: the first level contained subjects with no experience, the second level contained subjects with 1-10 years of experience, the third contained subjects with 11 to 20 years of experience and the fourth contained subjects with 21 to 30 years of experience.

*Procedure*

Data collection was completed following ethical approval by the researchers' institution. First for athletes, team coaches were asked for their consent. Following the coaches' consent their athletes filled out a questionnaire at the training site and prior to training. While for referees firstly permission was requested from the football, handball, and basketball referees' associations to administer. Next, they completed the questionnaire at the office of their association. Finally, for students relevant permits from the Ministry of National Education and Religious Affairs and the principles of the schools chosen were obtained.

*Measure*

*Achievement goals*. Athletes and students physical education filled out a validated Greek version (Papaioannou & McDonald, 1993) of the Task and Ego Orientation in Sports Questionnaire (TEOSQ; Duda & Nicholls, 1992) was used in order to assess dispositional goal orientations. The

stem was "I feel most successful in my sport when…" TEOSQ is a questionnaire consisting of 13-items. It includes two independent subscales measuring task (seven items; e.g., I learn new skills) and ego (six items; e.g., I come first) orientations as regards participation in sports. TEOSQ has demonstrated adequate internal consistency with satisfactory alpha coefficients for both the task (α = .79) and ego (α = .81) subscales (Duda & Whitehead, 1998). In the present study, the alpha coefficients were .91 and .75 for task and ego, respectively.

Referees filled out a modified form of TEOSQ (TEOSQ-R; Proios, Tsigilis, & Doganis, 2005). TEOSQ-R consists of two independent scales that evaluate individual differences and relate to Task or Ego participation in sport. It begins with the sentence: "I feel most successful in sport when…". The modified form of the test begins with the sentence: "I feel most successful as a referee when…", followed by 13 different sub statements. The respondent was asked to indicate the degree to which he agrees with each of the 13 statements (7 of which relate to task Orientation and 6 to Ego). Responses are given on a 5 point Likert scale ranging from *strongly agree* (5) to *strongly disagree* (1). In the present study, the alpha coefficients were .86 and .78 for task and ego, respectively.

**Results**

Regarding the way goal orientation is formed within achievement domain, the findings of the present study showed that task orientation holds a higher level than ego orientation among subjects ($M$ = 3.59, $SD$ = 10.35 to $M$ = 2.79, $SD$ = .83).

*Gender differences*

Multivariate analyses of variance indicated gender $\lambda$ = .989, $F(4,1138) = 1.65$, $p$ = .16, non differences on goal perspectives although females displaying higher levels than males on task orientation ($M$ = 3.73 vs $M$ = 3.52), and males higher levels than females on ego orientation ($M$ = 2.82 vs $M$ = 2.75) (see Table 1).

*Age differences*

Multivariate analyses of variance indicated age $\lambda$ = .895, $F(8,1150) = 8.19$, $p < .001$, $n^2$= .054, differences on goal perspectives. According to Cohen (1988), guidelines for interpreting an eta square value ($n^2$) is that .01 indicates a small effect, .06 indicates a moderate effect, and .14 indicates a large effect. Therefore, our finding that the $n^2$= .054 indicates that 5.4% of the total variance in achievement goal orientations is accounted for by age. A univariate $F$ test indicated that significant differences exist only on task orientation $F(4,581) = 14.91$, $p < .001$, $n^2$= .096. *Post hoc* Tukey tests showed that significant differences exist between ages 13-18 and all the rest ages on level $p < .001$. People between 13-18 years of age are more task-orientated that the rest of the ages mentioned above.

*Sport Experiences Differences*

Multivariate analyses of variance indicated age $\lambda$ = .973, $F(6,1140) = 2.59$, $p < .05$, $n^2$= .013$p < .05$, $n^2$= .013, differences on goal perspectives. The eta square indicates that 1.3% of the total variance in achievement goal orientations is accounted for by sport experiences. Univariate $F$ tests have not shown significant effects on the $p < .05$ level when it comes to goal perspectives.

*Form Participation Differences*

Multivariate analyses of variance revealed significant main effects for form participation $\lambda$ = .945, $F(8,1160) = 7.64$, $p < .001$, $n^2$= .026. The eta square indicates that 2.6% of the total variance in achievement goal orientations is accounted for by form participation. A univariate $F$ test indicated that significant differences exist on task and ego orientation $F(2,584) = 12.07$, $p < .001$, $n^2$= .040 and $F(2,584) = 3.05$, $p < .05$, $n^2$= .010, respectively. *Post hoc* Tukey tests showed that significant differences exist between subjects physical education and referees, athletes and referees only on task orientation ($M$ = 3.84 vs $M$ = 3.25 and $M$ = 3.68 vs $M$ = 3.25) on level $p < .001$ (Table 1).

*Type of Sport Differences*

Multivariate analyses of variance revealed significant main effects for type of sport $\lambda$ = .866, $F(8,1154) = 10.72$, $p < .001$, $n^2$= .069. The eta square indicates that 6.9% of the total variance in achievement goal orientations is accounted for by type of sport. A univariate $F$ test indicated that significant differences exist on task and ego orientation $F(4,583) = 17.87$, $p < .001$, $n^2$= .110 and $F(4,583) = 8.91$, $p < .001$, $n^2$= .058, respectively. *Post hoc* Tukey tests showed that significant differences exist on task orientation between physical education and football, other sport ($M$ = 3.81 vs $M$ = 3.39 and $M$ = 3.07), handball and football, other sports ($M$ = 3.94 vs $M$ = 3.39 and $M$ = 3.07), basketball and football, other sports ($M$ = 3.87 vs $M$ = 3.39 and $M$ = 3.07) on level $p < .001$

(Table 1). On ego orientation between physical education and basketball ($M$ = 2.89 vs $M$ = 2.51), football and handball, basketball ($M$ = 2.97 vs $M$ = 2.63 and $M$ = 2.51), others sports and handball, basketball ($M$ = 3.00 vs $M$ = 2.63 and $M$ = 2.51), on level $p < .001$ (Table 1).

**Discussion**

The primary purpose of this investigation was to determine whether dispositional achievement goal orientation profiles that are reported in the literature are observed in three Greek samples (athletes, referees and physical education and exercise). Based on previous studies, gender, age, athletic experience, form of participation and type of sport were included as independent variables.

Results presented a predominance of task-oriented (M = 3.59) over ego-oriented (M = 2.79). The achievement goal findings were similar to those found by researchers (e.g., Cervello, Rosa, Calvo, Jimenez, & Iglesias, 2007; Hodge, Allen, & Smellie, 2008; Stuntz & Weiss, 2009).

Up to date the developmental course of goal orientation had been examined through the children's understanding of cognitive elements such are: effort and ability in the academic domain (Nicholls, 1978) and in the physical domain (Fry & Duda, 1997). Both studies' samples included children ages 5-13. Their results revealed a significant relation among age and level of understanding of effort and ability in both academic and physical domains. The results of the present study are in agreement with those of previous studies, revealing that developmental changes in goal orientation continue to exist after the age of 13 and at least up to 18 presenting an upward trend (e.g., Dweck, 2002). The variability of the way children understand effort and ability in different ages, Fry and Duda (1997) claimed that this may be due to the different cognitive level and not on the different age. This is more understood through the examination of cognitive-developmental model that considers that the developmental stages even though they follow the same course they do not necessarily appear in the same time for everyone (Salkind, 1985).

The developmental part of Nicholls' theory was confirmed for the athletic domain in the present study, since it revealed significant individual differences in task orientation. In the present study, contrary to physical education, task orientation presented a descending trend. More specifically, results showed that athletes 13-18 years old present significantly higher task orientation compared to those of 19-50 years old. This is possibly due to the fact that athletes of a young age are not able to accurately determine their ability and for this reason they focus on effort- a characteristic of individuals that are task oriented (Roberts, 1984). According to Nicholls (1984), children show a mature understanding of this ability until they are in their teens. It would be interesting at this point to mention that the results of the present study presented that only 50% of children in the 11$^{th}$ grade show a mature understanding of effort and ability (Xiang & Lee, 2002). Another cause for this difference is the fact that development leads to a gradual predominance of the characteristics of ego-participation (White & Duda, 1994). The prevalence of ego-participation may be due to the increase of competitiveness from high school to college (Chaumeton & Duda, 1988). This though was not confirmed in the present study. It could be hypothesized that the increase of competitiveness led to the reduction of ego-participation in goal achievement, without though affecting ego-participation.

It has been repeatedly stressed that experiences consist an important element in the formation of goal orientation (Nicholls, 1989). He supported that individual differences in predisposition on goal orientation is a consequence of social experiences acquired in achievement domain. The findings of this study enhanced the claim of Nicholls. Similar findings were found in other studies as well (Hodge & Petlikchoff, 2000; Tuffey, 2001). Experience increases ego orientation in various athletic situations. This effect becomes stronger when competitiveness increases (e.g., from junior high school to high school). The increase in competitiveness leads to an increase in competitiveness between players and a greater will to win.

Theory and study on goal achievement in both physical and academic domains report that individuals express different perceptions on the ways used to achieve success (Nicholls, 1989). This is also confirmed by the findings of the present study that showed an affection of the form of participation on predisposition on goal orientation. Additionally, beliefs reveal the strategies adopted for goal achievement in both competition and action (Roberts, 2001). In the present study the referees presented significantly lower task orientation from athletes and physical educators

despite the fact that referees were task oriented. This is possibly due to the different perception of benefits from participating in sports (Roberts, 2001).

Another finding of the present study was the non differentiation of the predisposition on goal orientation between genders. The present finding comes in agreement with the finding of a study that examined differences in gender in children of 10-13 years of age that participated in various organized sports (White, Duda, & Keller, 1998). No significant differences in gender were reported by Fry and Duda (1997) for both physical and academic domain. Contrary to findings of previous studies, a study examining members of the Swimming Olympic Team revealed important differences in gender (Tuffey, 2001). Other studies presented similar findings (e.g., Hodge & Petlichokoff, 2000; Li, Hamer, & Acock, 1996). In each situation, regardless of the revealing or not of important differences in gender, girls presented a much more intense task-involved, ego-participation in goal achievement. This may be due to the greater focus of men on winning (White & Duda, 1994) and that they are more competitive than women. The values of "winning" and "competition" are related to ego orientation. Additionally the differences among men and women may be explained by the fact that women focus on caring for others and are interested in human relationships Gilligan (1982).

Finally, the hypothesis this study that exist type of sport-differences on goal orientation was confirmed. Literature refers to a connection of goal orientation and experienced enjoyment, satisfaction, and interest during participation in physical activities (Roberts, 2001). This reveals that differences found in the present study are possibly due to the different feelings of individuals within the frame of achievement goal orientation depending on the type of sport. Duda, Chi, Newton, Walling, & Catley (1995), and Duda and Nicholls (1992), using high school students, and Jackson and Roberts (1992) college athletes reported a positive relationship between task orientation and flow, an intrinsically enjoyable experience.

Table 1

Descriptive Statistics

| Variables | Levels | Task | | Ego | |
|---|---|---|---|---|---|
| | | M | SD | M | SD |
| Age | 13-18 | 3.95 | .61 | 2.76 | .75 |
| | 19-23 | 3.23 | 1.18 | 2.86 | .81 |
| | 24-27 | 3.71 | .97 | 2.75 | .64 |
| | 28-35 | 3.45 | 1.17 | 2.76 | .98 |
| | 36-50 | 3.37 | 1.26 | 2.85 | 1.03 |
| Experiences | 0 | 3.79 | .78 | 2.92 | .70 |
| | 1-10 | 3.56 | 1.06 | 2.74 | .84 |
| | 11-20 | 3.50 | 1.15 | 2.89 | .86 |
| | 21-30 | 3.45 | 1.28 | 2.72 | 1.23 |
| Gender | Males | 3.52 | 1.08 | 2.82 | .87 |
| | Females | 3.73 | .94 | 2.75 | .72 |
| Form of Participation | Physical education | 3.84 | .64 | 2.91 | .71 |
| | Athletes | 3.68 | .99 | 2.73 | .76 |
| | Referees | 3.25 | 1.23 | 2.89 | 1.01 |
| Type of Sport | Football | 3.39 | 1.19 | 2.97 | .99 |
| | Handball | 3.94 | .79 | 2.63 | .75 |
| | Basketball | 3.87 | .78 | 2.51 | .79 |
| | Other sports | 3.07 | 1.22 | 3.00 | .72 |
| | Physical Education | 3.80 | .65 | 2.89 | .72 |

**Conclusion**

The findings of the present study offer a range of conclusions. First of all, it is found that individual differences in goal orientation are observed in each form of participation in physical activities, among participants in various sports. Second, participants in physical activities present differences in goal orientation in each phase of their age. Third, athletic experiences significantly affect the predisposition to achievement goal orientation. Finally, it is concluded that gender does not consist an important element for achievement goal orientation in sports.

**References:**


1. Ames, C., & Archer, J. (1988). Achievement goals in the classroom: students learning strategies and motivation processes. *Journal of Educational Psychology, 80*, 260-267. Retrieved from http://www.apa.org/pubs/journals/edu/index.aspx.
2. Cervelló, E., Santos-Rosa F. J., García Calvo, T., Jiménez, R., & Iglesias D. (2007). Young tennis players' competitive task involvement and performance: the role of goal orientations, contextual motivational climate, and coach-initiated motivational climate. *Journal of Applied Sport Psychology, 19,* 304-321. doi: 10.1080/10413200701329134
3. Chaumeton, N., & Duda, J. L. (1988). It is how you play the game or whether you win or lose?: The effect of competitive level and situation on coaching behaviors. *Journal of Sport Behavior, 11*, 157-174.
4. Clayton-Jones, L., Rodwell, K., Skehan, J., Chan, L., & Moore, P. (1992). *Approaches to learning attributions, goal orientations and achievement: A developmental perspective.* Paper presented at the AARE/NZARE Joint Conference, Geelong, Victoria.
5. Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.
6. Duda, J. L. (1987). Toward a developmental theory of children's action tendency scale. *Journal of Sport Psychology, 9*, 130-145.
7. Duda, J. L. (1988). The relationship between goal perspectives and persistence and intensity among recreational sport participants. *Leisure Sciences, 10*, 95-101. doi:10.1080/01490408809512180
8. Duda, J. L. (1989a). Goal perspectives, participation and persistence in sport. *International Journal of Sport Psychology, 20*, 42-56.
9. Duda, J. L. (1989b). Relationship between task and ego orientation and the perceived purpose of sport among high school athletes. *Journal of Sport & Exercise Psychology, 11*, 318-335. Retrieved from. http://journals.humankinetics.com/jsep
10. Duda, J. L., & Hom, H. L. (1993). Interdependencies between the perceived and self-reported goal orientations of young athletes and their parents. *Pediatric Exercise Science, 5*, 234-241.
11. Duda, L. J., & Nicholls, J.G. (1992). Dimensions of achievement motivation in schoolwork and sport. *Journal of Educational Psychology, 84*, 290-299. Retrieved from http://dx.doi.org/10.1037/0022-0663.84.3.290
12. Duda, J. L, & Whitehead, J. (1998). Measurement of goal perspectives in the physical domain. In J. L. Duda (Ed.), *Advances in sport and exercise psychology measurement* (pp. 21-48). Morgantown, WV: Fitness Information Technology.
13. Duda, J. L., Chi, L., Newton, M., Walling, M. D., & Catley, D. (1995). Task and ego orientation and intrinsic motivation in sport. *International Journal of Sport Psychology, 26,* 40-63.
14. Dweck, C. S. (2002). The development of ability conceptions. In A. Wigfield & J. Eccles (Eds.), *Development of achievement motivation* (pp. 57–88). San Diego, CA: Academic Press.
15. Elliot, A. J. (1999). Approach and avoidance motivation and achievement goals. *Educational Psychologist*, *34*, 169-189. doi:10.1207/s15326985ep3403_3
16. Elliot, A. J., & Church, M. A. (1997). A hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Psychology*, *72*, 218-232. Retrieved from http://dx.doi.org/10.1037/0022-3514.72.1.218
17. Elliot, A. J., & Harachiewicz, J. M. (1996). Approach and avoidance achievement goals and intrinsic motivation: A mediational analysis. *Journal of Personality and social Psychology*, *70*, 461-475. Retrieved from http://dx.doi.org/10.1037/0022-3514.70.3.461

18. Ewing, M., Roberts, G., & Pemberton, C. (1983). *A Developmental Look at Children's Goals for Participating in Sport*. Paper presented at the Annual Meeting of the North American Society for the Psychology of Sport and Physical Activity, East Lansing, MI.

19. Fry, M. D. (2000a). A developmental analysis of children's and adolescents' understanding of luck and ability in the physical domain. *Journal of Sport & Exercise Psychology, 22*, 145–166. Retrieved from http://journals.humankinetics.com/AcuCustom/Sitename/Documents/DocumentItem/1128.pdf

20. Fry, M. D. (2000b). A developmental examination of children's understanding of task difficulty in the physical domain. *Journal of Applied Sport Psychology, 12*, 180–202. doi:10.1080/10413200008404223

21. Fry, M. D., & Duda, J. L. (1997). A developmental examination of children's understanding of effort and ability in the physical and academic domains. *Research Quarterly for Exercise and Sport, 68*(4), 331-344. doi:10.1080/02701367.1997.10608014

22. Gilligan, G. (1982). *In a different voice: Psychological theory and woman's development*. Cambridge MA: Harvard University Press.

23. Hodge, K., & Petlichkoff, L. (2000). Goals profiles in sport motivation: A cluster analysis. *Journal of Sport & Exercise Psychology, 22*, 256-272. Retrieved from http://journals.humankinetics.com/AcuCustom/Sitename/Documents/DocumentItem/1124.pdf

24. Jackson, S. A., & Roberts, G. C. (1992). Positive performance states of athletes: Toward a conceptual understanding of peak performance. *The Sport Psychologist, 6,* 156–171.

25. Hodge, K., Allen, J. B., & Smellie, L. (2008). Motivation in masters sport: achievement and social goals. *Psychology of Sport and Exercise, 9*, 157-176. doi:10.1016/j.psychsport.2007.03.002.

26. Li, F., Harmer, P., & Acock, A. (1996). The task and ego orientation in sport questionnaire: Construct equivalence and mean differences across gender. *Research Quarterly for Exercise and Sport, 68*(2), 228-238. doi: 10.1080/02701367.1996.10607949

27. Linnenbrink, E. A., & Pintrich, P. R. (2002). Achievement goal theory and affect: An asymmetrical bidirectional model. *Educational Psychologist, 37*, 69-78. doi:10.1207/S15326985EP3702_2

28. Newton, M. L., & Duda, J. L. (1993). Elite adolescent athletes' achievement goals and beliefs concerning success in tennis. *Journal of Sport & Exercise Psychology, 15*, 437-448. Retrieved from http://journals.humankinetics.com/AcuCustom/Sitename/Documents/DocumentItem/9113.pdf

29. Nicholls, J. (1978). The development of the concepts of effort and ability, perception of own attainment, and the understanding that difficult tasks require more ability. *Child Development, 49*, 800-814. doi:10.2307/1128250

30. Nicholls, J. G. (1984). Achievement motivation: Conceptions of ability, subjective experience, task choice, and performance. *Psychological Review, 91,* 328-346.

31. Nicholls, J. G. (1989). *The Competitive Ethos and Democratic Education*. Cambridge, MA: Harvard University Press.

32. Nicholls, J. G. (1992). The general and the specific in the development and expression of achievement motivation. In G. C. Roberts (Ed.) *Motivation in Sport and Exercise* (pp. 31-56). Champaign, IL: Human Kinetics.

33. Papaioannou, A., & McDonald, A. I. (1993). Goals perspectives and purposes of physical education as perceived by Greek adolescents. *Physical Education Review, 16*, 41-48.

34. Pekrun, R., Elliot, A. J., & Maier, M. A. (2006). Achievement goals and discrete achievement emotions: A theoretical model and prospective test. *Journal of Educational Psychology, 98*(3), 583-597. doi: 10.1037/0022-0663.98.3.583

35. Proios, M., Tsigilis, N., & Doganis, G. (2005). Examining referees' task and ego orientation in sport: A preliminary examination of the construct validity of a questionnaire. *International Journal of Sport & Exercise Psychology, 3*, 223-233. doi:10.1080/1612197X.2005.9671768

36. Roberts, G. C. (1984). Achievement motivation in children's Sport. In J. G. Nicholls, J. G. (Ed.). *Advances in Motivation and Achievement*. (Vol. 3; pp. 251-281). Greenwich, CT: JAI Press.

37. Roberts, G. C. (2001). Advances in motivation in sport and exercise. In G.C. Roberts (Ed.). *Understanding the dynamics of motivation in physical activity: The influence of achievement goals on motivational processes* (pp. 1-50). Champaign, IL: Human Kinetics.

38. Salkind, N. J. (1985). *Theories of Human Development*. New York: John Wiley & Sons.

39. Stuntz, C. P., & Weiss, M. R. (2009). Achievement goal orientations and motivational outcomes in youth sport: The role of social orientations. *Psychology of Sport and Exercise, 10*, 255-262. doi:10.1016/j.psychsport.2008.09.001

40. Treasure, D. C., & Roberts, G. C. (1994). Cognitive and affective concomitants of task and ego goal orientations during the middle school years. *Journal of Sport & Exercise Psychology, 16*, 15-28. Retrieved from http://journals.humankinetics.com/AcuCustom/Sitename/ Documents/DocumentItem/9024.pdf

41. Tuffey, S. (2001). *Olympic Trials Project – Sport Psychology*. Retrieved from webb 5/11/2001 http:// usswim.org/programs/template.pl?opt=news&pubid=943.

42. White, S. A., & Duda, J. L. (1994). The relationship of gender, level of sport involvement, and participation motivation to task and ego orientation. *International Journal of Sport Psychology, 25*, 4-18.

43. White, S. A., &Duda, J. L., & Keller, M. R. (1998). The relationship between goal orientation and perceived purpose of sport among youth sport participants. *Journal of Sport Behavior, 21*(4), 474-483.

44. Williams, L., & Gill, D. L. (1995). The role of perceived competence in the motivation of physical activity. *Journal of Sport & Exercise Psychology, 17*, 363-378. Retrieved from http://journals.humankinetics.com/AcuCustom/Sitename/Documents/DocumentItem/9008.pdf

45. Xiang, P., & Lee, A. (2002). Achievement goals, perceived motivational climate, and students' self-reported mastery behaviors. *Research Quarterly for Exercise and Sport, 73*(1), 58-65.