# CISM 2019
## INTERNATIONAL SYMPOSIUM

## International Military Sport Council

# CISM 2019 STRUCTURE

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# AUTHORITIES

## CISM´S PRESIDENT INTRODUCTORY WORDS

Dear CISM Friends,

First, I would like to thank the Ecuadorian delegation, which is helping CISM, through the organization of this symbolic edition, to ensure, after ten long years of absence, the continuity of one of the traditional CISM institutional event, the CISM International Symposium.

The history of this event started 57 years ago as the first edition was held in Greece in 1962 with the explicit goal of gathering the CISM Family and sharing scientific knowledges for application to military fitness training, sports and health.

This year, scientists from the civilian and military society from many CISM Member Nations are gathered in Quito for an intense week of knowledge transfer with an exceptional line-up of keynote speakers, lecturers and poster presenters. I am confident that this edition will be the source of a significant development of the scientific research in the military sport area. In addition, it will be also a platform where people from around the world can meet in order to promote friendship, solidarity and peace.

Moreover, I would like to take this opportunity to highlight the contribution of Commandant Raoul Mollet, a true CISM Legend who was fully committed to the development of the Sport and Science within CISM and I'm very proud to announce that, for the first time in the CISM History, the Commandant Raoul Mollet ACISM Sport Science Award will be awarded to the best scientific research on a topic of interest for CISM.

Finally, I would like to thank the Ecuadorian delegation, the CISM Academy and the CISM Sports Science Commission for the work they achieved this year!

Friendship through Sport!

**Colonel Hervé Piccirillo**

**CISM President**


## CISM´S SECRETARY GENERAL INTRODUCTORY WORD

Dear CISM Friends,

It has been a long waiting but after ten years of absence, the CISM International Symposium is back. This institutional event, organized for the first time in 1962 in Greece, five years after the creation of the CISM Academy, was organized to the attention of the CISM family on all continents, in the form of clinics and seminars, with the goal of transmitting scientific knowledges for application to military fitness training, sports and health.

We are gathered here in Ecuador for a symbolic edition which is a new starting point for scientific researches within CISM.

At this time, civil and military stakeholders from ten different countries and four CISM continents will take the floor to share their knowledge, with a program consisting of 25 oral presentations and posters.

In addition, for the first time in its history, CISM will award the Commandant Raoul Mollet ACISM Sport Science Award, a recognition that will be given to the personality who best represented the ACISM and the best scientific research on a topic of interest for CISM.

In conclusion, I would like to express my sincere thanks to the Ecuadorian delegation, the CISM Academy, the CISM Sports Science Commission and the Speakers for organizing this wonderful event!

Friendship through Sport!

**Colonel Dorah Mamby Koita,**

**CISM Secretary General**

## MESSAGE OF THE EDITOR-IN-CHIEF

Dear CISM Family,

Dear researchers,

On behalf of the President and Secretary General of CISM, I am delighted to share with you the celebratory launch of this issue of the Proceedings Book of the CISM International Symposium 2019. It is with great honor and pleasure the International Military Sports Council relaunches the event after a decade which is the most important scientific event of military sport. This edition of the CISM International Symposium is being held in Quito, Ecuador with an aim to promote intensive discussion along with publication of original studies.

With the theme “CISM at age 70: History and Science of Sport working together at the Academy”, the conference provides an important forum for addressing critical issues in the field of Sport and Physical Education within Armed Forces. The participants, exchanging new ideas, and disseminating the latest developments in basic research, with a focus on fitness and performance of military sports, psychophysiological military fitness and operational readiness, science increasing performance inside the military sports, management and partnership inside the military sport field, will contribute, as one of tools, to the knowledge sharing between Armed Forces.

This Symposium is an open and democratic space to discuss sport-related issues in a scientific standard and, as usual, gives space to the scientific discoveries of researchers from different Armed Forces around the world, as it has been since its first realization in Greece, in 1962, five years after the establishment of the CISM Academy, main educational and cultural offshoot of CISM.

I am extremely excited to embark on this very important purpose and reading this book which is based on the papers presented and in the high-quality presentations on very different topics at International Symposia. The CISM gratitude to all excellent and highly qualified speakers who decided to share their knowledge with us and to all participants for the remarkable and active cooperation with which created more than fruitful and constructive discussions after every presentation.

I also would like to express my thankfulness to the Ecuadorian Delegation which, supported by the CISM Sports Science Commission and the CISM Academy, has allowed an excellent meeting in the beautiful historic city of Quito, located in the “half of the world”.

I wish you all an excellent reading!

**Friendship though Sport!**

**Colonel (Brazilian Army) Luiz Fernando Medeiros Nóbrega, MSc**

**CISM Sports Director**

## Ecuadorian Military Sports Federation Welcome

After a long recess, CISM Academy retakes the important task of organizing the “International Scientific Symposium CISM Quito, Ecuador 2019”. This task was assigned to our country. Thanks to the effort and support of the military and civilian authorities, we have done our best and directed our teamwork with the will and purpose of achieving our goal. As in every task, several difficulties were encountered at the beginning of the activities. The first steps were the most complicated. Nevertheless, the tenacity and the desires of contributing with faith and optimism allowed us to materialize a good planning, little by Little, for the organization and execution of this important academic event. It would not have been possible to complete this project if we had not had the collaboration of each one of the different actors who participated in this organization. The support and coordinations executed between the members of the scientific commission of CISM and the Ecuadorian Military Sports Federation (FEDEME) gave the fundamental thrust for the good organization, of which we feel very proud to have arrived to a happy fulfillment.

All the different lecturers presented important topics of interest in the area of physical culture thus encouraging the development of a high performance in military sports. Besides, the people both national and international attending this event, gave the splendor with their presence according to the demands and protocols settled down for such an event. We thank so much to the authorities of the CISM, the members of the scientific commission, the officers of the sister Republic of Brazil, the military authorities of the Joined Command and of the Armed forces of Ecuador for their outstanding participation. Every moment they supported the planned and performed actions by the Direction of the Ecuadorian Military Sports Federation, and in this way they allowed to stimulate this great project. A new challenge remains to be settled down for the next organizing country in two years. The proposal is outlined starting now. We wish the best successes and hope the corresponding importance may be granted. We will be alert and as always supporting with devotion and fidelity the ideals and the fundamental premise of the International Council of Military Sports, “Friendship through Sports”.

**LTCol. Víctor Iván Martínez Alvarado**

**Fedeme’s Director**

# PROGRAM

CISM 2019
INTERNATIONAL SYMPOSIUM
QUITO - ECUADOR

# *CISM INTERNATIONAL SYMPOSIUM 2019*

## *Quito – Ecuador*

## *3rd to 8th June, 2019*

## *"CISM at 70's:*

## *History & Sport Science working together in the Academy"*

## *PROGRAM:*

| **Tuesday JUN-04**<br>Hotel Quito<br><br>Uniform: Class A | |
|---|---|
| **Time** | **Activity** |
| **9:00-10:30** | **Registration** |
| 10:30-11:30 | **Opening Ceremony** |
| 12:00-13:30 | **Lunch** |
| 13:30-14:30 | **Opening session**<br><br>*CISM and Sports Science through it 70 years course* – **Maj Athinodoros Moschopoulos** (Greece) – PhD candidate |
| **1st session**<br><br>*CISM, Armed Forces and civilian institutions as promoters of Sports & Science* | |
| 14:30-15:00 | ***1.a** Propuesta de valoración de la condición física al Servicio de Protección Presidencial* – **Capt Fabian Uquillas** (Ecuador) |
| 15:00-15:30 | ***1.b** The Effects Of Neuromuscular Training On Injury Prevention In Military Personnel: A Meta-Analysis* – **Lt Priscila Bunn** (Brazil) MSc |
| 15:30-16:00 | **Coffee break** |
| 16:00-16:30 | ***1.c** The effect of Initial Physical Fitness-levels on Musculoskeletal Injuries and Operational readiness in the South African National Defence Force* – **Lt Col Etresia Terblanche** (South Africa) |
| 16:30-17:00 | ***1.d** Changes in physical performance and body composition in relation to initial BMI and aerobic fitness categories during military service* – **Mr Kai Pihlainen** (Finland) MSc |

| | |
|---|---|
| 17:00-17:30 | **Discussion** |
| **Wednesday JUN-05**<br>Hotel Quito<br>Uniform: Class A (lecturers) – Service Uniform (audiences) | |
| **Time** | **Activity** |
| **2nd session5**<br>*Fitness and Performance of Military Sports* | |
| 9:00-09:30 | ***2.a** Explosive Force Production in Military Pentathlon athletes and female perceptions regarding Obstacle Run* – **Lt Col Eduardo Borba** (Brazil) PhD |
| 9:30-10:00 | ***2.b** Diferencias biomecánicas entre deportistas militares principiantes y alto rendimiento en lanzamiento de granada* – **Capt Mayra Burbano** (Ecuador) – MSc |
| 10:00-10:30 | **Coffee break** |
| 10:30-11:00 | ***2.c** Intra-Rater Agreement Of The Musculoskeletal Injury Risk Classification By Dynamic Movement Assessment™: A Pilot Study* – **Lt Priscila Bu**nn (Brazil) MSc |
| 11:00-11:30 | ***2.d** El desarrollo de la fuerza en maratonistas de la Federación Deportiva Militar del Ecuador (FEDEME)* – **Mrs Edith Sunta**xi (Ecuador) |
| 11:30-12:00 | **Discussion** |
| 12:00-13:30 | **Lunch** |
| **3rd session**<br>*Psychophysiological Military Fitness and Operational Readiness* | |
| 13:30-14:00 | ***3.a** The future of Wearable Monitoring for Sports Performance Enhancement* – **Mr Karl Friedl** (USA) PhD |
| 14:00-14:30 | ***3.b** Mobile Training Applications for preparation of conscripts to Military Service* – **Mr Thomas Wyss** (Switzerland) PhD |
| 14:30-15:00 | ***3.c** Biomecánica del Tiro de Pistola Calibre 22 y Aire en deportistas de ambos sexos de Pichincha* – **Cbos Yesenia Hernánd**ez (Ecuador) |
| 15:00-15:30 | **Coffee break** |
| 15:30-16:00 | ***3.d** Fit to compete – Fit to fight – Fit for life. Interpreting and reporting metrics in physical fitness* – **Mr Patrick Gagnon** (Canada) PhD |
| 16:00-16:30 | ***3.e** Análisis comparativo de las Pruebas Físicas del Personal Naval: región Costa y Sierra* – **Navy Lt Juan Balde**on (Ecuador) |
| 16:30-17:00 | **Discussion** |
| **Thursday JUN-06**<br>Hotel Quito<br>Uniform: Class A | |
| **Time** | **Activity** |
| **4th session**<br>*Science increasing performance inside the military sports* | |
| 9:00-9:30 | ***4.a** Strength Training: basics and applications in Military Environment* – **Mr Heikki Kyröläinen** (Finland) PhD |
| 9:30-10:00 | ***4.b** World Champion: against all odds* – **Pvt Sara Hjalage**r (Denmark) PhD |
| 10:00-10:30 | **Coffee break** |
| 10:30-11:00 | ***4.c** Using a Sports Performance Model to build a Military Tactical Athlete Readiness Program* – **Mrs Jaqueline Laframboi**se (Canada) PhD |

| | |
|---|---|
| 11:00-11:30 | ***4.d** What makes a team greater than the sum of its parts? From applied sports psychology to optimizing military team functioning* – **Mr Jamie Collins** (Canada) PhD |
| 11:30-12:00 | **Discussions** |
| 12:00-13:30 | **Lunch** |
| **5th session**<br>*Management and partnership inside the military sport field* | |
| 13:30-14:00 | ***5.a** Update of physiological effects in military swimming* – **Mr Alfonso Barbosa** (Colombia) |
| 14:00-14:30 | ***5.b** CISM contributions to peace* – **Col Luiz Fernando Medeiros Nóbrega** (Brazil) - MSc |
| 14:30-15:00 | ***5.c** Composición Corporal y su relación con el rendimiento deportivo del Equipo de Pentatlón Aeronáutico Militar de la Fuerza Aérea Ecuatoriana* – **Maj Luis Palacios** (Ecuador) |
| 15:00-15:30 | **Coffee break** |
| 15:30-16:00 | ***5.d** Proprioception in Sports* – **Mr Anibal Boada** (Ecuador) |
| 16:00-16:30 | **Discussion** |
| 16:30-17:30 | **Closing session**<br>*Innovation for developing human capital & resources in sport federations. Perspectives for Sport in the CISM context* – **Mr Thierry Zintz** (Belgium) PhD |
| 18:00-18:30 | **Closing Ceremony** |
| 20:00-23:00 | **Closing banquet** |
| **ALL DAYS** | |
| 9:00-17:00 | **Posters**<br>*Effects of 4 weeks resistance training on vertical jump of military soccer players* – **Runer Augusto Marson** (Brazil)<br>*Dissimilarity of mental skills, personality traits, alexithymia and humor state of shooting sport athletes from the Army Forces* – **Mrs Angela Neves** (Brazil) PhD<br>*Biomarkers of cell injury in Brazilian military soccer athletes: training session responses at different season time points* – **Mrs Míriam Mainenti** (Brazil) PhD<br>*Metabolic Risk in Brazilian Military Personnel: Sex-Specific-Differences*–**Mr Marcos Fortes** (Brazil)PhD |
| **Friday JUN-07**<br>Quito – Cultural Day<br>Uniform: Casual Dress | |

*1 st SESSION*

# CISM, ARMED FORCES AND CIVILIAN INSTITUTIONS AS PROMOTERS OF SPORTS & SCIENCE

CISM 2019
INTERNATIONAL SYMPOSIUM
QUITO - ECUADOR

# FABIAN GONZALO UQUILLAS MALDONADO

***ECUADORIAN ARMY INFANTRY CAPTAIN***

## Country:

Ecuador

## Institution:

Ecuadorian military sports federation

## Background:

Especiality Infantry, Ecuadorian Army, Garduated In Phisycal Activity And Sports In Ecuadorian Armed Forces University.

## Current Function:

Orienteering Coach Of The Armed Forces Team

# Proposal for Fitness Evaluation at the Presidential Protection Service Personnel

**FABIAN GONZALO UQUILLAS MALDONADO**

Army Infantry Captain - Ecuadorian Armed Forces University

**Abstract**

The Presidential Protection Service is a special unit in charge of the security of the main leaders of the nation, that´s why its members should be the best specialized personnel to fulfill that mission; so it´s necessary to have a comprehensive selection process that integrates reliability tests, psychological tests, medical tests and use of fire guns, without setting aside an important aspect such as physical condition. That is why, based on a scientific basis study, it has been established the conditioning and determinant physical capacities that protection agents use and founded on their energy substrates, to propose specific tests for the evaluation of their physical condition. To achieve this goal, field tests, observation cards and bibliographical studies have been used, so that, through a mixed methodology among quantitative and qualitative data, a convergence of results can be obtained through a methodological triangulation and thereby propose ready-reckoners and values of weighting for the battery of the proposed tests, based mainly on agility, reaction speed, speed of displacement, explosive force, coordination, flexibility and intermittent aerobic resistance. This will ensure that during the selection process the most physically capable agents for the presidential protection service are obtained.

**Keywords:**

Presidential Protection Service, test, personnel selection, physical test

# PRISCILA BUNN

***BRAZILIAN NAVY LIEUTENANT***

## Country:

Brazil

## Institution:

Brazilian Navy, CEFAN, Research Laboratory of Exercise Science

## Background:

Physiotherapist (Federal University of Rio de Janeiro); Msc in Biomedical Engineering (Federal University of Rio de Janeiro); PhD candidate in exercise and sport sciences (Rio de Janeiro State University)

## Current Function:

Researcher - Physical Education Center Admiral Adalberto Nunes (Brazilian Navy)

# The Effects Of Neuromuscular Training On Injury Prevention In Military Personnel: A Meta-Analysis

**PRISCILA BUNN[1,2], GABRIELA SALIBA[2], GLÓRIA SILVA[2], RAMDEL CALDAS[2], RAVINI SODRÉ[2], JACQUELINE ESTEVES[1], ELIREZ SILVA[2]**

[1]Brazilian Navy, CEFAN, Research Laboratory of Exercise Science, Rio de Janeiro RJ, Brazil

[2]Rio de Janeiro State University, Exercise and Sport Sciences Postgraduate Program, Rio de Janeiro RJ, Brazil

**Introduction:** Musculoskeletal injuries (MSI) are the main reason for medical care among military personnel. Among athletes, neuromuscular training (NMT) have promoted a lower chance of developing MSI. Such exercises have the potential to reduce modifiable risk factors for MSI. However, there are no meta-analysis that have evaluated the effects of such exercises in military personnel. Therefore, the aim of this meta-analysis was to evaluate the effects of NMT on the prevention of musculoskeletal injuries in military personnel.

**Methods:** A systematic literature search was carried out in November 2018 in MEDLINE, LILACS, SCOPUS, BVS, SPORTDiscus, CINAHL and Web of Science databases. Reference lists were explored to find studies that examined the effects of NMT on the prevention of MSI in military personnel. The following keywords were used as Medical Subject Headings (MeSH) descriptors: “wounds and injuries”, “prevention”, “exercises” and “military personnel”. Sample size, types of exercises, training period, and number of participants that sustained one or more injuries in experimental and control groups were extracted from the studies. Cochrane Scale was used to assess the risk of bias of the studies. For the data analysis, the Revman 5.3 Software was used, in which the measure of RR was investigated.

**Results:** A total of 867 studies were retrieved from the databases. After the removal of duplicated titles and studies which did not meet the eligibility criteria, seven studies were included. NMT exercises differed among the studies (squats, balance exercises, jumps, core training, etc). Among the 3,776 military personnel who performed the NMT, 913 suffered injuries. In the control group, consisting of 4,046 participants, 968 were injured, showing no protective effect for this type of training (RR = 0.97 and 95% CI = 0.81-1.15) to prevent injuries (Figure 1). Only two studies presented a low risk of bias (Childs et al., 2010; Goodall, Pope, Coyle, & Neumayer, 2013). Level of evidence: very low.

**Discussion and conclusion:** NMT exercises were not effective in preventing MSI in the military personnel. On the contrary, studies with athletes indicated that NMT during the pre-season reduce the chance of injury. Perhaps, the heterogeneity of the samples and the level of physical conditioning at the beginning of military life explains this contradiction. The studies included in the present meta-analysis performed their exercise protocols for injury prevention simultaneously with military training. Possibly, NMT did not promote gradual increases in the training load. Therefore, the military personnel could be more susceptible to muscle fatigue. At the same time, the high level of heterogeneity among the studies ($I^2$ = 75%), the lack of standardization regarding the definition of injuries and the risk of bias of the studies, resulted in a very low level of evidence for this meta-analysis.

**Practical implications:** NMT for MSI prevention does not seem to reduce the risk of injury in military personnel. It is suggested that NMT protocols injury prevention be carried out prior to military courses, thus allowing a more gradual adaptation of the training load.

**References:**

Brushøj, C., Larsen, K., Albrecht-Beste, E., Nielsen, M. B., Løye, F., & Hölmich, P. (2008). Prevention of overuse injuries by a concurrent exercise program in subjects exposed to an increase in training load: A randomized controlled trial of 1020 army recruits. American Journal of Sports Medicine, 36(4), 663–670. https://doi.org/10.1177/0363546508315469

Carow, S. D., Haniuk, E. M., Cameron, K. L., Padua, D. A., Marshall, S. W., DiStefano, L. J., … Gerber, J. P. (2016). Risk of Lower Extremity Injury in a Military Cadet Population After a Supervised Injury-Prevention Program. Journal of Athletic Training (Allen Press), 51(11), 905–918. https://doi.org/10.4085/1062-6050-49.5.22

Childs, J. D., Teyhen, D. S., Casey, P. R., McCoy-Singh, K. A., Feldtmann, A. W., Wright, A. C., … George, S. Z. (2010). Effects of Traditional Sit-up Training Versus Core Stabilization Exercises on Short-Term Musculoskeletal Injuries in US Army Soldiers: A Cluster Randomized Trial. Physical Therapy, 90(10), 1404–1412. https://doi.org/10.2522/ptj.20090389

Coppack, R. J., Etherington, J., & Wills, A. K. (2011). The American Journal of Sports Medicine The Effects of Exercise for the Prevention of Overuse Anterior Knee Pain. American Journal of Sports Medicine. https://doi.org/10.1177/0363546510393269

Goodall, R. L., Pope, R. P., Coyle, J. A., & Neumayer, R. (2013). Balance and agility training does not always decrease lower limb injury risks: A cluster-randomised controlled trial. International Journal of Injury Control and Safety Promotion, 20(3), 271–281. https://doi.org/10.1080/17457300.2012.717085

Knapik, J., Darakjy, S., Scott, S. J., Hauret, K. G., Canada, S., Marin, R., … JONE

S, B. H. (2005). Evaluation of a standardized physical training program for basic combat training. Journal of Strength and Conditioning, 19(2), 246–253.

Leppänen, M., Aaltonen, S., Parkkari, J., Heinonen, A., & Kujala, U. M. (2014). Interventions to prevent sports related injuries: A systematic review and meta-analysis of randomised controlled trials. Sports Medicine, 44(4), 473–486. https://doi.org/10.1007/s40279-013-0136-8

Parkkari, J., Taanila, H., Suni, J., Mattila, V. M., Ohrankämmen, O., Vuorinen, P., … Pihlajamäki, H. (2011). Neuromuscular training with injury prevention counselling to decrease the risk of acute musculoskeletal injury in young men during military service: a population-based, randomised study. BMC Medicine, 9(1), 35. https://doi.org/10.1186/1741-7015-9-35

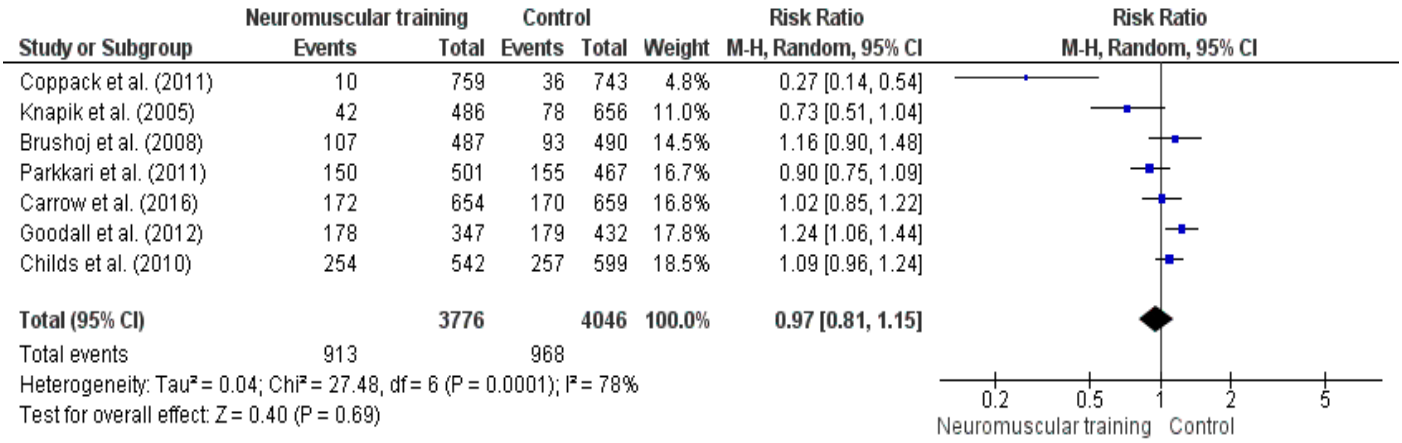


**Figure 1.** Forest Plot of the results from a random-effects meta-analysis of neuromuscular training programs for injury prevention. The results from a random-effects meta-analysis are shown as the relative risk (RR) with a 95% CI. For each study, the squares represent each study and the horizontal lines are the lower and upper limits of the 95% CI. The size of each square is indicative of the relative weight that the study carried in the meta-analysis.

# ETRESIA TERBLANCHE

***SOUTH AFRICA DEFENCE FORCE LT. COL.***


## Country:

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## Institution:

JPTSR Trg Cen (Joint Physical Training Sport and Recreation Training Centre)

## Background:

Experience in the Field of Human Movement Science (HMS) covers a period of 22 years. My knowledge includes academic qualifications namely an Honnours and Masters degree in Biokinetics, Public Senior Leaders programme at Wits Business school and experience in the management, research and development of this field in the South African Military Health Service. I'm based at Joint Physical Training, Sport and Recreation Training Centre. This centre provides training opportunities to members in the field of Human Movement Science, Sport and Recreation as well as Research and development.

## Current Function:

Second in Command, Joint Physical Training Sport and Recreation Training centre. Post (Research and Development)

# The effect of Initial Physical Fitness levels on Musculoskeletal Injuries and Operational readiness in the South African National Defence Force (SANDF)

**LANCHE ETRESIA TERBLANCHE**

,South African National Defence Force, Joint Physical Training Sport and Recreation Training Centre

Introduction: The primary purpose of this study was to survey a sample of Military Skills Development (MSD) recruits in the SANDF to establish the effect of initial fitness levels on Musculoskeletal Injuries and Operational readiness in the SANDF. Musculoskeletal injuries in Military environments are the most common cause for visits to medical care facilities (Konstantinos, 2011; Knapik, 2001; Clark, 2007). These injuries negatively affects operational readiness and military outputs since the treatment thereof is time-consuming and costly (Almeida,1997). Injuries that result in troops being placed on light duty restricts the availability for training.

Methods: The study design is a longitudinal study with repeated measures and self-controls. The sample consisted of 369 recruits (male=202; female=167). Measurements were taken at the onset of the 20 week BMT (Basic Military Training) programme and repeated in week 12 and week 20. Data collection included Weight (kg), Height (cm), Body Mass Index (BMI), SANDF fitness evaluation, recording of training injuries as per anatomical site and days of Light duty.

Results: Initial fitness levels of the group (n=369) (male=202; female=167) were 45,9% ±18,2, Males 50,9%±16,22 and Females 39,9%±18,4. 95 Members passed their fitness evaluation >60% and 273 failed <60%. Fitness levels of the group measured at week 12 and week 20 improved to 77,93%±14.05 and 77,34%±14,8.

Total injuries recorded for the group (n=369) were 732 with an average of 1,98±2,6 injuries per recruit. The total light duty days recorded were 1690 days with a group average of 4,58±8,9 days per recruit. The male population (n=202) had a total of 282 injuries with an average of 1,4±2,19 injuries per member and the Female population (n=167) had a total of 450 Injuries with an average of 2,75±2,96 injuries per member. Light duty days for the male population were 615 with an average of 3.06±7,18 days per member. The Light duty days for the female population were 1075 days with an average of 6,44±10,49 days per member. Male participants with fitness levels >60% (n=72) had an average of 1.03 injuries per member and 2.46 days light duty per member. Male participants with fitness levels <60% (n=129) had an average of 1.61 injuries per member and 3.4 light duty days per member. Female participants with fitness levels >60% (n=23) had an average of 1.52 injuries per member and 3.22 light duty days per member. Female participants with fitness levels <60% (n=144) had an average of 2.88 injuries per member and 6.95 light duty days per member as per Table 1.

**Table 1: Initial Fitness levels of Males and females vs injuries and light duty.**

| | Female injury statistics (n = 167) | | Male injury statistics (n = 201) | |
|---|---|---|---|---|
| Initial Fitness levels | < 60% (n=144) | > 60% (n=23) | < 60% (n=129) | > 60% (n=72) |
| Number of injuries | 415 | 35 | 208 | 74 |
| Number of light duty days | 1001 | 74 | 438 | 177 |
| Average injuries per member | 2.88 | 1.52 | 1.61 | 1.03 |
| Average light duty days per member | 6.95 | 3.22 | 3.4 | 2.46 |

Discussion: Results demonstrates a significant difference (p<0,001) between the male and female population with respect to initial fitness levels, rate of recorded injuries and light duty days. Injury reporting correlate strongly with initial fitness levels with a significant difference (p<0,001) between recruits with fitness levels below 60% and those above 60%. Results of the same study done in 2010 indicates that higher entry level fitness has a greatly reduced number of injuries.Practical implications: It is suggested that entry level fitness of 60% for recruits will reduce the number of injuries and will increase time available for training. This will ensure optimum operational readiness and reduce financial losses.

References:

Almeida S., Williams M., Shaffer R., Luz J., Badong K., Brodine S (1997). A Physical Training Program to Reduce Musculoskeletal Injuries in U.S. Marine Corps Recruits. Naval Health Research Center, Technical Report NHRC-07-2B. San Diego, CA, National Technical Information Service, U.S. Dept of Commerce.

Clark M.E., Bair M.J., Buckenmaier C.C 3rd, Girondo R.J., Walker R.L (20078). Pain and combat injuries in soldiers returning from Operations Enduring Freedom and Iraqi Freedom: implications for research and practice. J Rehabil Res Dev, 44(2),179-94

Killian D.B., Lee A.P., Lynch Ll, Gunzenhauser. J (2003). Estimating selected disease and nonbattle injury Echelon I and Echelon II outpatient visits of United States soldiers and marines in an operational setting from corresponding Echelon III (hospitalizations) admissions in the same theater of operations. Mil Med 2003, 168(4),293-7

Knapik J.J., Sharp M.A., Canham-Chervak M., Hauret K., Patton J.F., & Jones B.H (2001). Risk factors for training-related injuries among men and women in basic combat Training. Med Sci Sports Exerc, 33,94 6-54.

Konstantinos H., Dionysios K., Thrasivoulos P. (2011). Profiles of Musculoskeletal Inuries Among Greek Army Officer Cadets During Basic Combat Training: Military Medicine, 176, (3) 297.

Sanders J.W., Putman S.D., Frankart C., et al (2005). Impact of illness and non-combat injury during Operations Iraqi Freedom and Enduring Freedom (Afghanistan). Am J Trop Med Hyg, 73(4), 713-9

Wasserman G.M., Martin B.L., Hyams K.C., Merrill B.R., Oaks G., & McAdoo H.A.(1997): A survey of outpatient visits in a United States Army forward unit during Operation Desert Shield. Mil Med, 162(6), 374-9.

# KAI PIHLAINEN

***FINLAND DEFENSE COMMAND***

## Country:

Finland

## Institution:

Finland Defense Command

## Background:

PhD studies ongoing at the University of Jyväskylä, Faculty of Sport and Health Sciences, Biology of Physical Activity. Changes in body composition and physical performance of soldiers during crisis management operation. Member of the Finnish delegation in the Nordic Military Sport Leaders Annual Meeting.

## Current Function:

Sports coordinator (civ.) at the Competence Section of the Training division (J7)

# Changes in physical performance and body composition in relation to initial BMI and aerobic fitness categories during military service

**KAI PIHLAINEN, MATTI SANTTILA, AND HEIKKI KYRÖLÄINEN**

Finnish Defence Forces - Helsinki, Finland / National Defence University - Helsinki, Finland / University of Jyväskylä, Jyväskylä, Finland.

Introduction. In armed forces with general conscription, the trainees may be very heterogeneous in terms of initial physical performance. Still, same military training regime is typically performed for all trainees and both genders. This may lead to non-optimal training adaptations, as for some the training load may be too high and for some too low. The present study aims to compare the changes in physical fitness and body anthropometry in different initial body composition and endurance performance groups during the military service in Finland.

Methods. The study included data of 236,765 healthy young male conscripts (age 19.1±0.4 yrs.) who completed their service between the years 2005-2015. The data consisted results of 12-min running test, standing long jump, 1-min sit-up, 1-min push-up and, body anthropometrics. All these variables were recorded in the beginning (initial) and at the end of the 5,5-11,5-month compulsory military service. T-tests and one-way ANOVA (Post Hoc: Least Significant Difference) were used for testing within- and between-group differences, respectively. Correlative analyses were performed using Pearson correlation.

Results. In the whole data group, the mean improvement of the 12-minute running test was 107 meters (5%, $p<0.001$). The mean changes in standing long jump, 1-min sit-up and push-up tests were two cm (1%, $p<0.001$), four repetitions (19%, $p<0.001$) and five repetitions (33%, $p<0.001$), respectively. The overall changes in body anthropometrics were minimal. Moderate inverse correlations were observed between the result of initial 12-min running test and it´s change ($r = -0.46$, $p<0.001$) as well as initial BMI and it´s change ($r = -0.46$, $p<0.001$). In addition, when changes in physical performance and body composition were compared with initial body mass index (BMI) and aerobic fitness groups, the most marked improvement in the measured variables occurred in the highest BMI categories and/or the lowest fitness quartiles. On the other hand, the lowest or even negative adaptations were observed in initially high fit groups in some physical performance variables.

Discussion and conclusion. The overall physical fitness of the Finnish male conscripts improved during the compulsory military service. Especially, those with lower initial aerobic fitness level and/or higher BMI gained the largest improvements, which may have a significant impact on military readiness but also national health perspectives.

Practical applications. As the conscripts in the highest initial fitness quartile actually decreased their performance in many measured variables, more individualized and progressive physical training programs should be integrated to the rest of the military service if positive adaptations are desired for all conscripts. For the highest initial aerobic fitness quartile, BMI should be taken into consideration, as the adaptations of some variables were attenuated in the high fit but low BMI group while in others high BMI was associated with lower adaptations.

*2nd SESSION*

# FITNESS AND PERFORMANCE OF MILITARY SPORTS

CISM 2019
INTERNATIONAL SYMPOSIUM
QUITO - ECUADOR

# EDUARDO BORBA NEVES

***BRAZILIAN ARMY LT. COL.***

## Country:

Brazil

## Institution:

Brazilian Army Sports Commission

## Background:

Lieutenant Colonel of the Brazilian Army, he is with Brazilian Army Sports Commission and Professor at Graduate Program in Biomedical Engineering, Federal Technological University of Paraná. He has PhD degree in Biomedical Engineering and PhD degree in Public Health. He has published over 80 peer-reviewed international scientific papers and about 100 chapters in books, abstracts, proceedings, and domestic publications. Major research interests: Health diagnostic; Physical fitness; Thermal imaging; Therapeutic technologies.

## Current Function:

Sports Manager and Researcher at Brazilian Army Sports Commission

# Explosive Force Production in Military Pentathlon athletes and female perceptions regarding Obstacle Run

**EDUARDO BORBA NEVES**[1,2]

1. Brazilian Army Research Institute of Physical Fitness, Rio de Janeiro, Brazil
2. CISM Sport Science Commission, Brussel, Belgium

**Introduction:** The first International championship of Military Pentathlon was done in Military Physical Training Center in Freiburg, 1947, with Belgian, French and Dutch participants. Since the 1991 female competitors have been present, adapting only some rules previously applied to men. Despite the growing development that this sport has had, there are very few scientific studies published about it. There are some articles that show a morphological description of military pentathlon athletes.

The obstacle run is the more representative test of the Military Pentathlon. A previous study (Gdonteli, 2015) found differences in the performance between male and female cadets from Hellenic Military Academy, Athens, Greece, but the authors not make clear if they did the obstacle run with the same rules or with CISM rules (with differences in six obstacles).

When the obstacle run is seen as a military task, during the academic period, there is a discussion: all (male and female) have to do the same test or different rules are fair? Another point of view that also brings a doubt is: if in other sports, males and females do the same test, for example, marathon, swimming and etc..., why would be necessary adaptations in obstacle run?

Some people could say: “there are height differences between genders that justify the adaptations”, but…. There are males athletes with low height!

Others could say: “some obstacle as ladders are more dangerous to female because the biomechanical female structure”, but some male athletes do not jump from the top of these obstacles as well.

Thus, what really matters? Most of the obstacle requires explosive force production to climb and pass through the obstacle, and all adaptations are regarding the height of the female athletes and

of the obstacles. So, the aim of this was to compare explosive force production between genders among military pentathlon athletes and female perceptions regarding Obstacle Run.

**Methodology:** The participants consisted of 57 male and 27 female athletes (age varied from 20 to 35 years, and body height from 160 to 180cm) from 18 countries, who participated in the 64th World Military Pentathlon Championship. Thirty days before the event, a survey was sent to all delegation chiefs requesting anthropometric data and results of the Sargent jump test.

During the 64th World Military Pentathlon Championship, It was preceded 37 Interviews with the female athletes and female coaches regarding their possibilities to do obstacles: Rope Ladder, Sloping Wall with Rope, Irish Table, Four Steps of Beams, Pit, Vertical Ladder, and Assault Wall. These interviews were based in a Survey composed by 8 questions with answers in Likert scale format.

The results of the throwing distance test, when participants threw projectiles (575g for men and 375g for women) as long as possible, in 64th World Military Pentathlon Championship, was used to calculated the relative throwing distance (in meters) was by the Equation 1.

$$\text{Relative throwing distance} = \frac{TD \times WP}{BM} \qquad (1)$$

Where: TD = maximal throwing distance, WP = mass of the projectiles, BM = body mass of the athletes.

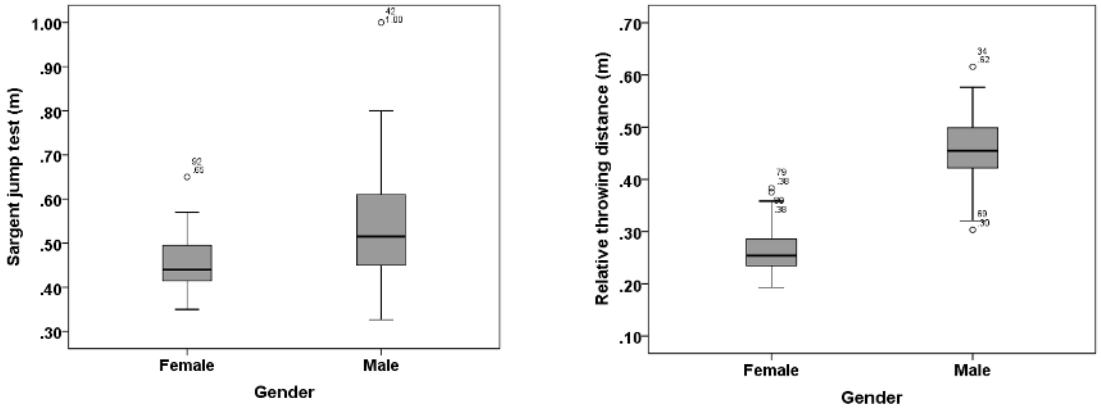
Statistical analyses were performed using SPSS (version 20.0). Normal distribution was assessed using the Shapiro-Wilk test. For the variables with normal distribution, means, standard deviations were calculated, and the Student's T-test was utilized to compare the groups. In addition, non-parametric analyses such as median, interquartile range and Wilcoxon signed rank test were used. Spearman's correlation coefficients were calculated. The statistical significance level was set at $p<0.05$. The Chi-square test was used to verify the distribution of perceptions reported in Survey with likert scale answers.

**Results:**

Table 1 presents the gender comparison of all the studied variables in the military pentathlon athletes. Figure 1 presents the results of the Sargent jump test and relative throwing distance. The results demonstrate a significant difference in explosive force production between male and female athletes.

*Table 1:* Gender comparison in the military pentathlon athletes.

| Variable | Gender | N | Median or mean* | Interquartile Range or Std. Deviation* | p value |
|---|---|---|---|---|---|
| Sargent jump test (m) | Male | 57 | 0.52 | 0.17 | 0.004 |
| | Female | 27 | 0.44 | 0.10 | |
| Relative throwing distance (m) | Male | 57 | 0.46 | 0.08 | <0.001 |
| | Female | 27 | 0.25 | 0.06 | |
| Obstacle run (s)* | Male | 57 | 147.40 | 7.76 | 0.014 |
| | Female | 27 | 152.22 | 9.23 | |




(a) (b)

*Figure 1:* Boxplot to Sargent jump test (a) and relative throwing distance (b) in the military pentathlon athletes.

Table 2 demonstrates that the results of the Sargent jump correlated with the times of the obstacle run and cross-country running among both sexes. In addition, relative throwing distance associated with the times of obstacle run and swimming in women but not in men. Figure 2 shows the distribution of perceptions reported in Survey with likert scale answers.

*Table 2:* Relationships between the results of explosive force production tests and the performance in the military pentathlon disciplines according to the gender

| Gender | Test | Sargent jump test (m) | Relative throwing distance (m) | Obstacle run (s) | Obstacle swimming (s) | |
|---|---|---|---|---|---|---|
| Female | Sargent jump test (m) | - | 0.18 | -0.416* | -0.138 | -0.616* |
| | Relative throwing distance (m) | 0.318 | - | -0.577* | -0.545* | -0.322 |
| Male | Sargent jump test (m) | - | 0.188 | -0.322* | -0.266* | -0.324* |
| | Relative throwing distance (m) | 0.188 | - | -0.249 | -0.164 | -0.086 |

* p<0.05

*Figure 2* shows the distribution of perceptions reported in Survey with likert scale answers, and Table 3 shows the Chi-square test used to verify the distribution of perceptions reported in Survey.

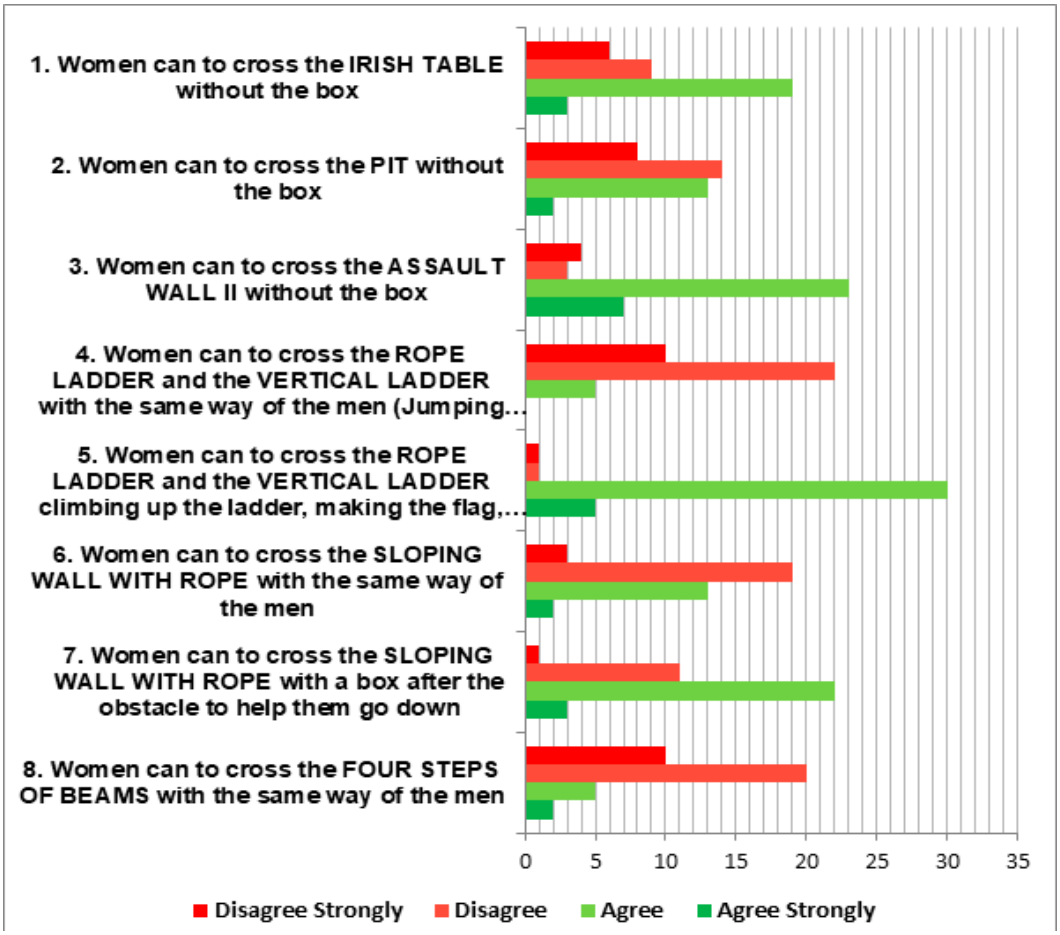



*Figure 2:* Interview with Female Athletes and Coaches in 64th Military Pentathlon World Championchip - Salinas, Ecuador, 2017.

*Table 3:* Chi-square analysis of female military pentathlon athletes and coaches perceptions regarding the obstacle run, acquired by survey with likert scale answers, during the 64th Military Pentathlon World Championchip - Salinas, Ecuador, 2017.

| Questions | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Chi-Square ($\chi^2$) | 1.32 | 1.32 | 14.3 | 19.7 | 29.43 | 1.32 | 4.57 | 14.3 |
| p value | 0.2498 | 0.2498 | 0.0002 | 0.0001 | 0.0001 | 0.2498 | 0.0326 | 0.0002 |

**Discussion and Conclusion**

The results show that the results of the Sargent jump test and relative throwing distance was statistically higher in males than in females. This was the case, although women used a lighter projectile. These results are in agreement with the study of Laffaye, Wagner, and Tombleson (2014) who investigated elite athletes in various sports, such as volleyball, basketball, baseball, and football. In addition, explosive force production seems to be associated more strongly with the females' pentathlon performance than males' one.

Based on Interviews, the statistical analysis suggests that there aren't a consensus among female athletes regarding to obstacles IRISH TABLE, PIT and SLOPING WALL WITH ROPE, but regarding the others questions, there is statistical significance that female athlete and coaches:

- Think that they can do the ASSALT WALL without the box (Question 3);
- Think that they can't do the ROPE LADDER and the VERTICAL LADDER with the same way of the men, Jumping from the top (Question 4);
- Think that they can do ROPE LADDER and the VERTICAL LADDER climbing up the ladder, making the flag, and going down halfway the ladder before jumping (Question 5);
- Think that they can't do the FOUR STEPS OF BEAMS with the same way of the men (Question 8);

**Practical Implications:** This study produced important information regarding power production among male and female military pentathlon athletes which can be used by the Sport Committee to review the competition rules. In addition, these data can be used by coaches to improve their knowledge about profiles needed to be an elite military pentathlon athlete, especially among female athletes.

**References:**

Gdonteli, K. (2015). Investigation of the obstacle course performance at the Hellenic Military Academy. *Journal of Physical Education & Sport, 15*(2).

Laffaye, G., Wagner, P. P., & Tombleson, T. I. (2014). Countermovement jump height: gender and sport-specific differences in the force-time variables. *The Journal of Strength & Conditioning Research, 28*(4), 1096-1105.

# MAYRA BURBANO BENAVIDES

*ECUADOR ARMY MILITARY INTELLIGENCE*

## Country:

Ecuador

## Institution:

Ecuadorian Military Armed Forces University

## Background:

Captain or the Ecuadorian Army. Specialty: military intelligence. Licensed in military sciences. Magister in management and educational leadership.

## Current Function:

Student Graduate Of The Career In Sciences Of The Physical Activity, Sports And Recreation Of Ecuadorian Armed Forces University.

# BIOMECHANICAL DIFFERENCES BETWEEN BEGINNERS AND HIGH PERFORMANCE MILITARY ATHLETES IN THROWING

**CAPTAIN MAYRA ARACELY BURBANO BENAVIDES**


## ABSTRACT

**Introduction:** The angles study of launching in grenade of the military pentathlon makes it possible to know the forces and accelerations that prevail as part of action field in biomechanics, making it possible to establish the behavior of certain variables that performance influence.

**Objective:** Biomechanical differences between beginner and high performance athletes are studied in the grenade launching test of the Military Pentathlon team of the Ecuadorian Armed Forces.

**Methods:** The athlete population of the Ecuadorian Military Pentathlon team (16 subjects) is studied, dividing the group into beginner and high-performance athletes. We study the three phases in grenade launch, launch time, average speed and acceleration of the wrist joint, and gravity center.

**Results:** The study determined the existence of lower angles in the studied variables in high-performance athletes with respect to beginners, some of them being significant, according to Mann-Whitney U-Test ($p= 0.05$).

**Conclusions:** The minor angles detected in studied biomechanical variables present in high-performance athletes can be predictive indicators of future performance in initiation athletes.


**Keywords:** Biomechanics; military athletes; grenade launch.

# PRISCILA BUNN

***BRAZILIAN NAVY LIEUTENANT***

## Country:

Brazil

## Institution:

Brazilian Navy, CEFAN, Research Laboratory of Exercise Science

## Background:

Physiotherapist (Federal University of Rio de Janeiro); Msc in Biomedical Engineering (Federal University of Rio de Janeiro); PhD candidate in exercise and sport sciences (Rio de Janeiro State University)

## Current Function:

Researcher - Physical Education Center Admiral Adalberto Nunes (Brazilian Navy)

# Intra-Rater Agreement Of The Musculoskeletal Injury Risk Classification By Dynamic Movement Assessment™: A Pilot Study

**PRISCILA BUNN[1,2], DANIEL ALVES[1], MARIA KOPPKE[1], ALLAN INOUE[1,2], ELIREZ SILVA[2]**

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[2]Rio de Janeiro State University, Exercise and Sport Sciences Postgraduate Program, Rio de Janeiro, RJ, Brazil

**Introduction:** Dynamic Movement Assessment™ (DMA™) is a tool developed to classify the risk of musculoskeletal injuries. It consists of filming the participant performing six functional tests with a two-dimensional (2D) biomechanical analysis software. Due to the low cost and feasibility of the DMA™, it can be used to evaluate individuals who practice physical exercises. However, its intra-rater agreement is unknown. Therefore, the purpose of this study was to investigate the intra-rater agreement of the DMA™ risk classification.

**Methods:** This was a pilot study for an intra and inter-rater concordance study. In this agreement study, after the anthropometric measurements, six weightlift athletes (two men) were filmed performing the six DMA™ tests (deep squat, step-up, single-leg squat, hop test, plank and side-plank test). Major and secondary deviations were observed during the tests. Each of the tests was rated with a score (if the pain was related to the test) ranging from zero to three points. Failing to perform the test or the presence of three minor deviations or a great magnitude major deviation characterized a one-point score. The presence of two secondary deviations or a major deviation with intermediate magnitude scored two points. Finally, individuals who performed the test without any clinically significant deviations were classified with three points. The videos analyses were performed in Kinovea 8.15.0 by an experienced healthcare professional. According to the score, participants were classified as high, moderate, medium or minimum risk to sustain an injury. To evaluate intra-rater agreement, the same video analysis was performed after two months. Kappa Concordance Analysis (k) was performed to evaluate the level of agreement. The statistical analysis was done with SPSS v.23.0.

**Results:** Three of the six athletes (17.5±2.9 years; 70.6±16.4 kg; 162.8±9.9 cm), were classified as

"medium risk", one as "high risk" and two as "moderate risk". Moreover, DMA™ presented a "substantial" intra-rater agreement (k=0.71; P=0.01). There was disagreement in the evaluation of one of six participants. and only one participant presented a disagreement.

**Discussion and conclusion:** This study aimed to determine the level of agreement of the DMA™ risk classification. It seems to be a tool with substantial intra-rater agreement (k = 0.71). It means that 29% of the collected data was erroneous. However, this is a pilot study, and further conclusions can be obtained with larger samples. Moreover, it is also important to analyze the method inter-rater agreement, which seems to be experience-dependent.

**Practical implications:** Coaches and physical therapists are frequently interested in the movement pattern assessments. In this context, reliability measures can help these professionals to understand whether a real change has occurred or whether some bias can explain the variation observed during DMA™ tests. Our main results indicated that DMA™ has a substantial intra-rater agreement. Therefore, this method may be useful in the evaluation of weightlift athletes. To improve its clinical application, the next step for this measure is to assess the inter-rater agreement with larger sample size.

**References:**

Bunn, P. S., & Silva, E. (2018). Dynamic Movement Assessment and Functional Movement Screening for injury prediction : a systematic review. Fisioterapia e Pesquisa, 25(3), 352–361. https://doi.org/10.1590/1809-2950/17004225032018

Nessler, T. D., & Haile, E. (2014). Dynamic Movement Assessment: Prevent Injury and Enhance Performance Kindle Edition. Publiwide, USA, 2014, 2014.

Nessler, T., & Mokha, M. (2013). Using Movement Assessment to Improve Performance and Reduce Injury Risk. International Journal of Athletic Therapy & Training, 18(2), 8–12. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=86157910&lang=pt-br&site=ehost-live

Sim, J., & Wright, C. C. (2005). The Kappa Statistic in Reliability Studies: Use, Interpretation, and Sample Size Requirements. Phys Ther, 85(3), 257–268. https://doi.org/15733050

# EDITH SUNTAXI

*M.Sc.*

## Country:

Ecuador

## Institution:

Ecuadorian Military Armed Forces University

## Background:

Third Level: Ecuadorian Armed Forces University. Degree obtained: Bachelor of Science in Physical Activity Sports and Recreation. Fourth Level: Ecuadorian Armed Forces University. Qualification obtained: Magister in Sports Training

## Current Function:

Trainer of the School of Athletics Initiation of the Secretary of Sport; Teacher of Physical Education at the Eduardo Manrique Private School; Athlete in background events in the Produbanco High Performance Club.

# The development of strength in marathon runners of the Military Sports Federation of Ecuador (FEDEME).

**M.Sc. EDITH SUNTAXI**

Ecuadorian Military Armed Forces University

**Introduction:** There are conflicts between coaches and athletes regarding strength training for marathon athletes and the management of concepts related to the fact that this type of training will make them heavy, tired and with greater muscle mass.

(Coyle, 2013) Mentions that the best way to achieve significant improvements in the marathon performance world record will be improving the resistance to fatigue within the muscle groups and in the activity of the joints that experience depletion of glycogen or neurological fatigue, It is here that when speaking of muscular groups force intervenes. (Añon, Pablo Biokinetics, 2017) performs an analysis citing several authors: From the physiological view, the force is a motor capacity that is manifested by the joint and coordinated action of the nervous and muscular system to generate tension and thus produce force. (Siff & Verkhoshansky, 2004).

The purpose of this research is to apply a strength program, with exercises in machines and weights that allow correlating the performance indicators through sampling before and after the strength program.

**Methods:** The research was carried out on the entire male population of marathon runners of the FEDEME, comprising 4 athletes, aged between 30 and 42 years. Tests were performed: 1000 m, 5000m, 27km, 42.195km, and long jump without impulse race. The VO2 Maximum and Lactate were determined in the 1000m test. , the heart rate and time were considered in all the tests, in the long jump without impulse race the distance was determined, all of them before and after applying a force program, in a regime of isotonic contraction. The results obtained were processed by central tendency statisticians.

**Results:** There was evident improvement in all the Running tests and in the Long jump from place, indicative of an effective development of both the aerobic resistance, as well as the lactic resistance and the rapid strength. The physiological indicators VO2max, maximum and minimum heart rate, maximum and minimum lactate values and lactate clearance showed very positive displacements, indicative of the influence of the applied force program.

**Discussion:** The research carried out reaffirms what is mentioned in the research the effect of strength training on performance in endurance athletes (Beattie, Kenny, Lyons, & Carson, 2014). A technique to improve neuromuscular efficiency in athletes is through strength training, benefiting from general way to athletes. During the general preparation phase, greater volumes of strength training should be used, Strength Training for Endurance Athletes: Theory to Practice, (Bazyler, Abbott, Bellon, Taber, & Ston, 2015) this theory could not be confirmed since at the time of the investigation, the athletes were in the competitive stage. In the research, the values obtained from the blood lactate stand out as very positive, once the application of the force program is concluded, directly associated with a better lactic preparation of the runners.

**Practical implications:** Direct the research towards a more prolonged application of the strength program, using, in a dominant way, the use of exercises with machines and weights, due to its variability when applied at different angles of muscular work, complying with the loads of each athlete in accordance to the phase. Continue applying the strength program in the FEDEME marathoners to systematize the achievements.

**References:**

Añon, Pablo Biokinetics. (22 de febrero de 2017). Obtenido de https://g-se.com/entrenamiento-de--la-fuerza-orientado-a-actividades-deportivas

Bazyler, C. D., Abbott, H. A., Bellon, C. R., Taber, C. B., & Ston, M. H. (Abril de 2015). Strength Training for Endurance Athletes: Theory to Practice. Johnson City Tennesee, Washington, E.E.U.U.

Beattie, K., Kenny, I. C., Lyons, M., & Carson, B. P. (Junio de 2014). <<PuvMed.gov. Obtenido de https://www.ncbi.nlm.nih.gov/pubmed/24532151

Coyle, E. F. (2013). Regulacion Fisiologica del Rendimiento en el Maratón. https://g-se.com.

Siff, M. C., & Verkhoshansky, Y. (2004). Superentrenamiento. Barcelona: Paidotribo.

*3 rd SESSION*

# PSYCHOPHYSIOLOGICAL MILITARY FITNESS AND OPERATIONAL READINESS

CISM 2019
INTERNATIONAL SYMPOSIUM
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# KARL E. FRIEDL

*U.S ARMY*

## Country:

U.S.A

## Institution:

U.S Army

## Background:

B.A. (1976) and M.A. (1979) degrees in zoology from the University of California, Santa Barbara and the Ph.D. degree in biology (1984) through the Institute of Environmental Stress in the University of California, Santa Barbara. His research has been focused on extending limits of human physiological performance.  He has published nearly 200 original articles, book chapters, technical reports, and commentaries, and made over 250 scientific presentations at national and international meetings.

## Current Function:

Senior Research Scientist, Physiology (Performance), U.S. Army Research Institute of Environmental Medicine, Natick, Massachusetts USA

# The Future of Wearable Monitoring for Sports Performance Enhancement

**KARL E. FRIEDL**

U.S. Army Research Institute of Environmental Medicine, Natick, Massachusetts USA

**Introduction:** Wearable monitoring technologies may be useful for military and sports performance enhancement. Monitoring training workload and thermal work strain can provide safer and more effective training of military recruits.[1,2] However, the role of physiological monitoring in performance enhancement of experienced performers remains an open question: does this provide advantage over expert self-awareness, and could it ever become so useful that it might be banned from competition as unfair "technological doping?"

**Technology Development:** Wearable physiological sensors can now provide an unprecedented amount of information about an individual in real time. This "technology push" has been stronger than the "athlete/performance pull," and many commercially available systems are in search of a problem to solve. For example, elite Kenyan runners routinely lose water (~3.0% body weight) during running, and this may provide an advantage in improved oxygen transport and reduced body mass.[3] However, sophisticated technologies based on sweat and skin hydration are marketed to "optimize water balance" without scientific validation against total body water and performance outcomes, or with demonstrated improvement over experienced athlete self-assessment, simple body weight change, or urine color. Activity monitoring, estimated physical workload, and sleep can be useful data in individual training management; movement patterns in team sports have also been useful to coaches; future data on continuous biochemistry such as lactate, and information on brain and mood state may prove to be useful data to manage performance but, initially, only as research tools.[4] Wear-and-forget systems built into smart shoes and functional fabrics are being developed and will be commonly available in the near future.[5,6]

**Current Research and Applications:** Real time physiological data has been used to optimize pacing. In one demonstration, an endurance cyclist competing in a 5000 km race planned rest periods around computed optimizations based on physiological fatigue factors and the conditions on the path ahead.[7] In another experiment, individuals were optimized by computer feedback based on their real time physiological status, with continuous advice on their pace in order to complete a distance within a set time while remaining as cool as possible.[8] In this example, novice runners were helped by computer pacing but an experienced triathlete was able to self-pace just as well as the computer; thus, athletes may not gain an additional benefit, unless confronted by new conditions

for which they have are not prepared (e.g., work at altitude). Near-future technology may provide stress management feedback using a "physiologically aware virtual human" acting as a virtual coach to the soldier athlete, based on machine interpretation of neurophysiological and behavioral signals.[9] These may be obtained from monitoring movement patterns in smart shoes, eye movements, facial action units, voice stress, and even stress odors. In initial studies, young soldiers were more willing to interact and disclose personal issues with a virtual human.[9]

**Practical Implications:** Wearable physiological monitoring is useful in recruit training. It may also provide value to experienced soldier athletes, with insights on performance, injury prevention, and stress management based on patterns of movement and physiological signals, but this has to be demonstrated.

## References

1Wyss T, Scheffler J, Mäder U. (2012) Ambulatory physical activity in Swiss Army recruits. International Journal of Sports Medicine 33:716-22.

2Buller MJ, Welles AP, Friedl KE. (2017) Wearable physiological monitoring for human thermal-work strain optimization. Journal of Applied Physiology 124:432-41.

3Noakes TD. Hydration in the Marathon. Sports Medicine. 2007 Apr 1;37(4-5):463-6.

4Friedl KE. Military applications of soldier physiological monitoring (2018) Journal of Science and Medicine in Sport 21:1147-53.

5Eskofier B, Lee S, Baron M, Simon A, Martindale C, Gaßner H, Klucken J. (2017) An overview of smart shoes in the internet of health things: gait and mobility assessment in health promotion and disease monitoring. Applied Sciences 7:986 (doi:10.3390/app710098).

6MIT News (2017) Advanced Functional Fabrics of America opens headquarters steps from MIT campus. MIT News June 19, 2017 (available: http://news.mit.edu/2017/advanced-functional-fabrics-america-afFoa-opens-headquarters-steps-from-mit-campus-0619)

7Barton, D. (2016) IBM analytics and race across America, Jun. 20, 2016. (available: https://www.ibm.com/blogs/internet-of-things/race-across-america/)

8Buller MJ, Welles AP, Stevens M, Leger J, Gribok A, Jenkins OC, Friedl KE, Rumpler W. (2015) Automated guidance from physiological sensing to reduce thermal-work strain levels on a novel task. In: IEEE 12th International Conference on Wearable and Implantable Body Sensor Networks (BSN) Jun 9, 2015 (pp. 1-6).

9Lucas GM, Rizzo A, Gratch J, Scherer S, Stratou G, Boberg J, Morency LP. (2017) Reporting mental health symptoms: breaking down barriers to care with virtual human interviewers. Frontiers in Robotics and AI 4:51.

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# Biomecánica del tiro de pistola calibre 22 y aire en deportistas de ambos sexos de Pichincha

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**Introducción:** El tiro es un deporte olímpico que comprende un alto nivel competitivo por lo tanto su estudio biomecánico es fundamental para corregir errores y determinar la técnica más óptima, elevando el rendimiento del deportista.

**Objetivos:** Determinar la técnica más óptima del tiro de pistola en los deportistas de pichincha por medio de un estudio biomecánica; tomando en cuenta las características físicas y los resultados obtenidos durante diversas competencias.

**Materiales y métodos:** el presente proyecto se realizará en diez deportistas que comprenden los clubes de la FEDEME y Concentración Deportiva de Pichincha por medio de un estudio de los diferentes movimientos de la técnica, para analizar los ángulos en el gesto motor tanto en fase inicial, recorrido y fase final; estas medidas serán analizadas con el programa Kinovea y estos serán comparados entre los diferentes deportistas y de acuerdo al rendimiento se determinará los factores técnicos que influyen en que un deportista tenga un mejor resultado que otro. Los datos obtenidos serán analizados por medio del programa SPSS para análisis de datos estadísticos.

**Resultados:** entre los datos comparados la gran mayoría de ángulos y centros de gravedad no presentaron diferencias significativas dado a que estos movimientos se basaban en técnicas generales del tiro de pistola y no requerían de una fuerza mayor para su realización; mientras que en el ángulo de desplazamiento de la cabeza y del tronco factores como la fuerza si influyen ya que existirá mayor inclinación cuando no exista la masa muscular adecuada, propio de deportistas iniciantes.

**Discusión:** se determinó que el ángulo vertical promedio para todo deportista hombre o mujer independientemente de su estatura es de 90 grados en la fase final, mientras que los ángulos que

determinan las diferencias significativas son los de la cabeza y el tronco ya que sufren inclinaciones muy pronunciadas con respecto al centro de gravedad, dadas por el encuadre de miras y la falta de desarrollo muscular para soportar el tiempo del arma, no se puede comparar los datos determinador ya que no existen estudios previos en biomecánica del tiro de pistola.

**Palabras Clave:** Biomecánica, tiro, técnica deportiva, rendimiento.

**Referencias**

Acero, J., Suarez , G. R., Kwon, Y., & Gerald, S. (2009). Biomecánica deportiva y control del entrenamiento. Medellín: Funambulos .

Briones. (2016). Marina Pérez termino su participación en tiro olímpico de Rio. Ecuavisa.

Fernando, M. G. (2014). Propuesta de guia metodológica para la enseñanza de los fundamentos técnicos básicos del tiro deportivo con pistola neumáticas en deportistas juveniles . Santiago de Cali : Universidad del Valle.

González, A. (12 de Mayo de 2016). Optometría Deportiva. Tiro Olímpico con Arma Corta. Optometría Deportiva. Tiro Olímpico con Arma Corta. Valladolid , España : Universidad de Valladolid.

Leite, W. S. (2013). Biomecánica aplicada al deporte: contribuciones, perspectivas y desafíos. efdeportes.

MUÑOZ GIL, L. H. (2014). PROPUESTA DE GUÍA METODOLÓGICA PARA LA ENSEÑANZA DE LOS FUNDAMENTOS TÉCNICOS BÁSICOS DEL TIRO DEPORTIVO CON PISTOLAS NEUMÁTICAS EN DEPORTISTAS JUVENILES. SANTIAGO DE CALI: UNIVERSIDAD DEL VALLE.

Pómes, T. (01 de enero de 2008). Revista del Instituto de Posturología y Podología . Obtenido de Revista del Instituto de Posturología y Podología : http://www.ub.edu/revistaipp/

Puerto Carla Andre, L., & Santos, L. (2013). Control postural y sistema vestibulo-oculomotor en atletas de tiro deportivo de la modalidad pistola. Universidad Centro de Augusto Motta.

# PATRICK GAGNON

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## Country:

Canada

## Institution:

Directorate of Fitness, Canadian Forces Morale & Welfare Services.

## Current Function:

National Manager Human Performance Research & Development

# Fit to compete, fit to fight, fit for life: Interpreting and reporting metrics in physical fitness.

**PATRICK GAGNON, DENIS COUTURIER, PETER NICOL AND PHILIP NEWTON.**

Directorate of Fitness, Canadian Armed Forces

Introduction: Most military organizations around the world test physical fitness on a regular basis. The data collected during test administration could lead to more impact than simply determining if a soldier is fit enough to serve his or her country. A strategic approach to data analytics supported with adequate information technology can lead to powerful business intelligence solutions leveraging physical fitness data.

**Methods:** The Canadian Armed Forces (CAF) have implemented and electronic data collection system (eFit) to track results of all CAF personnel on the FORCE Evaluation. This system has allowed the data to be analyzed and graphed on the FORCE Fitness Profile. The Fitness Profile is a graph that reports results on two distinct axes: the Health-Related fitness level (X axis) and the Operational fitness (Y axis). Upon finishing the FORCE evaluation, each CAF member receives an immediate debrief on the location of his or her test performance on the Fitness Profile. The aggregation of all test results allows the CAF the view the data collected based of a variety of different filters. Data can be displayed as average of units, brigades, age, gender, rank, occupation, or the entire CAF just to name a few.

**Results:** The analysis of FORCE dats shows that on average, CAF members that participate in CISM sports teams are much fitter and healthier than tre rest of the CAF. Running and triathlon rank to the far right of the graph meaning they are the sports where athletes display the healthiest fitness score. Basketball, soccer and volleyball seem to rank higher on the graph than other sports, meaning that these athletes are more operationally fit, than other sports. Sports participation also seems to mitigate the decrease in fitness that comes with older age. Old-timer Hockey athletes (35yr +) perform better than their aged-matched counterparts on the FORCE Evaluation. Data is also reported for the different structure levels of the CAF. These reports allow for a visual display of aggregate data of the entire CAF, the Army, a specific formation or division, even specific units at a given location. This type of information is critical to affect change in culture of physical fitness by providing visibility and accountability to the chain of command.

**Conclusion:** Currently, the metrics collected by the CAF on physical fitness are mostly descriptive in nature, showing what happened in the past year. The evolution of the eFit system will focus on improving its monitoring and even predictive functions. Innovations in business intelligence (BI) and robust analytics will allow for more proactive actions to be taken before issues happen leading to better optimization of soldiers performance.

# JUAN PABLO BALDEÓN

*ECUADORIAN NAVY LIEUTENANT*

## Country:

Ecuador

## Institution:

Ecuadorian Navy

## Current Function:

Officer in charge of the Cultural Physical Department in the Navy Academy

# Comparative analysis of physical tests of Naval Staff. Coastal and mountain region

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**Introducción:** Las pruebas de condición física, desde el punto de vista biológico, son un procedimiento científico realizado bajo condiciones estandarizadas que miden diversas características de forma empírica, especificándose las mediciones médico-biológicas como indicadores fundamentales del rendimiento profesional de soldados del ejército.

**Objetivo:** El Objetivo de la investigación es comparar el rendimiento de los evaluados en la región costa y sierra utilizando cuatro test (carrera, flexiones de cadera, natación y trepar cabo) correspondientes a las pruebas físicas del personal Naval en el primer semestre del año 2015.

**Métodos:** El estudio llevado acabo fue de tipo observacional, retrospectivo, analítico y transversal, en el cual se evaluó a los hombres y mujeres de edades comprendidas entre 18 y 30 años.

**Resultados:** En el análisis estadístico se observó que en el grupo masculino de la sierra comparado con el de la costa, hubo diferencia significativa en las disciplinas que evalúan fuerza (flexiones de cadera y trepar cabo).

**Conclusiones:** El estudio evidenció que los factores ambientales (ej. presión barométrica, temperatura, humedad) no ejercen influencia en las pruebas físicas de fuerza realizadas en la región sierra. Además, es importante señalar que el rendimiento masculino y femenino de las dos regiones

en las pruebas de natación sobrepasó las expectativas de las tablas de evaluación. Por tal motivo, como recomendación se debe realizar un nuevo estudio para estandarizar y determinar los puntos de corte adecuados para las respectivas pruebas físicas.

**Palabras Clave:** Pruebas Físicas, Personal Naval; Ecuador

**Abstract:**

The objective of this research is to compare the performance of the Naval personnel in the coast and highland region using four test (running, hip flexor, swimming and climbing out) which correspond for physical test in the first half of 2015. This is an observational, retrospective, analytical and transversal study, in which men and women aged between 18 and 30 years 11 months old from the coast and highland region were evaluated. The statistical analysis showed that there were significant differences in the disciplines that assess strength (hip flexor and climb out) in the male group from the highland compared to the coast region. This finding evidences that environmental factors (e.g. barometric pressure, temperature, humidity) do not have influence on physical strength tests conducted in the highland region. It is also important to note that the male and female performance from both regions in the swimming test surpassed the expectations of the evaluation tables. Therefore there should be a new study to standardize and determine appropriate cut points for the respective physical assessment.

**Referencias**

Knapik JJ, Harman EA, Steelman RA, Graham BS. A systematic review of the effects of physical training on load carriage performance. The Journal of Strength & Conditioning Research. ; 26(2): p. 585-597.

Kraemer WJ, Szivak TK. Strength training for the warfighter. The Journal of Strength & Conditioning Research. 2012; 26: p. S107-S118.

Patricio TY. El entrenamiento militar en el rendimiento físico de oficiales y voluntarios del grupo de fuerzas especiales nº 27 Grad. Miguel Iturralde. Informe final del Trabajo de Graduación o Titulación previo a la Obtención del Título de Licenciado en Ciencias Humanas y de la Educación. Ambato: Universidad Técnica de Ambato, Facultad de Ciencias Humanas y de la Educación; 2015.

Armada del Ecuador. http://www.armada.mil.ec/armada/mision-y-vision/. [Online].; 2012 [cited 2016 02 22. Available from: http://www.armada.mil.ec/armada/mision-y-vision/.

Asamblea N. Ley de Personal de las Fuerzas Armadas. 2009..

Wolf T. Geografía y geología del Ecuador Leipzig: Tipografía F. A. Brockhaus; 1892.

Huttel C. Las grandes regiones climáticas y sus formaciones vegetales naturales. 1997..

Nebel J, Wright RT. Ciencias ambientales: ecología y desarrollo sostenible: Pearson Educación; 1999.

Moya R. Climas del Ecuador. Quito:; 2006.

Gough CE, Saunders PU, Fowlie J, Savage B, Pyne DB, Anson JM, et al. Influence of altitude training modality on performance and total haemoglobin mass in elite swimmers. European journal of applied physiology. 2012; 112(9): p. 3275-3285.

Chapman RF, Stickford AS, Lundby C, Levine BD. Timing of return from altitude training for optimal sea level performance. Journal of Applied Physiology. 2014; 116(7): p. 837-843.

Terrados N. El Entrenamiento en altitud. INFOCOES. 1994;: p. 26-38.

Barroso AP. Entrenamiento en Altitud. [Online].; 2012 [cited 2016 Febrero 24. Available from: http://aamoratalaz.com/articulos/ENTALT05.pdf.

Bichon M. Entrenamiento en Altitud. Problemas, accidentes e incidentes. Cuadernos de Atletismo. 1984;: p. 97-100.

Jean-Francois. Entrenamiento de medio fondo en altitud. Cuadernos de Atletismo. 1984;: p. 13-19.

INAMHI. Predicción y vigilancia de condiciones meteorológicas para el país. Quito:; 2015.

Calero S, González S. Preparación física y deportiva Quito: Editorial de la Universidad de las Fuerzas Armadas ESPE; 2015.

American College of Sports Medicine (Ed.). ACSM's health-related physical fitness assessment manual. USA: Lippincott Williams & Wilkins.; 2013.

Kenney WL, Wilmore J, Costill D. Physiology of Sport and Exercise 6th Edition. USA: Human kinetics.; 2015.

Lyakh V, Mikołajec K, Bujas P, Litkowycz R. Review of Platonov's "Sports Training Periodization. General Theory and its Practical Application"–Kiev: Olympic Literature, 2013. Journal of human kinetics. 2014; 44(1): p. 259-263.

Haff GG, Triplett NT. Essentials of Strength Training and Conditioning 4th Edition. USA: Human kinetics.; 2015.

Romero E. Entrenamiento Deportivo: Conceptos y Metodología. Habana; 2008.

Porter R, Whelan J. Human muscle fatigue: physiological mechanisms Pitman medical. Pitman medical. 1981.

Armada E. Procedimiento para la Recepcion de Pruebas Físicas al Personal de la Fuerza Naval.

2011..

Armitage , Berry , Matthews JNS. Statistical Methods in Medical Research (4th edition) Oxford: Blackwell Science; 2001.

Mazza J. Fisiología del Ejercicio y del entrenameinyo en la altura.; 2011.

Hollmann W. The historical development of altitud training and current medical knowledge. New studies in athletics. 1994;: p. 9, 7-7.

Wilmore JH, Costill DL. Fisiologia del esfuerzo y del deporte Barcelona: Paidotribo; 2007.

Perez A. Asociación atletica Moratalaz. [Online]. [cited 2016 Febrero 24. Available from: http://aa-moratalaz.com/articulos/ENTALT05.pdf.

*4 th SESSION*

# SCIENCE INCREASING PERFORMANCE INSIDE THE MILITARY SPORTS

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# SARA ALMHOLT HJALAGER

***DANISH ARMED FORCES HEALTH SERVICES***

## Country:

Denmark

## Institution:

Danish Armed Forces Health Services, Centre for Military Physical Training

## Background:

MSc in Sports Science; World Champion in Military Pentathlon 2018; 2012-present: Private, Danish Army Home Guard; 2012-present: Military Pentathlete, the Danish Defence; 2012-2018: MSc Sports Science, University of Aarhus, Denmark; 2017-present: Physical trainer for the Danish Invictus Games team; 2018-present: Consultant in the Danish Military Sports Federation and the Danish Sports Federation's Soldier Project for wounded veterans.

## Current Function:

Consultant in the Danish Military Sports Federation and the Danish Sports Federation's Soldier Project for wounded veterans.

# World Champion – against all odds

**SARA ALMHOLT HJALAGER**

Danish Armed Forces Health Services, Centre for Military Physical Training

**Introduction:** After 25 years of Chinese dominance in the women's competition in military pentathlon, Danish military pentathlete, Sara A. Hjalager, managed to become the first European to win the World Championship in almost three decades. But how did Sara A. Hjalager, manage to beat the odds and stand as World Champion of 2018, with no economic support and up to 20 hours of training per week for while at the same time studying full-time and having to work a part time job.

**Methods:** Through a subjective case study, Sara A. Hjalager takes into account the different factors that may have played a role in her way to becoming the best military pentathlete in Danish history, by assessing the environment in which she trains, the conditions for her training and the psycho-logical aspects during both training and competition. Results from the competitions Sara A. Hjalager attended from 2012 to 2018, both national and international, will illustrate the progress of her performance parallel to her life situation.

**Results:** With a curious approach to the sport, competitive teammates and dedicated coaches, Sara A. Hjalager made the impossible, possible. Not being afraid to aim high, Sara A. Hjalager set a goal to become the best she could be. Not necessarily being the best in the world but pushing her own limits to become the best military pentathlete she could be under the given circumstances.

**Discussion and conclusion:** Being a non-professional military pentathlete competing against full-time athletes, Sara A. Hjalager was forced to make daily sacrifices to make time for training, training camps and competitions alongside studies and work. Circumstances that makes her achievement even more remarkable. The impact of her teammates and coaches play the biggest part in Sara A. Hjalager's World Champion title. The strength of the team is not to be neglected. The Danish women's team in military pentathlon has never been stronger than it has been in the past decade. It is no coincidence that almost all Danish records have been broken in the 8 years that Sara A. Hjalager has been competing in military pentathlon. Being friends, teammates and competitors and wanting to make each other better individually and as a team, has had the biggest impact on the way Sara A. Hjalager approach to the sport. The Danish military pentathlon team has managed to make an individual sport into a team effort, completely changing the mindset of the game and making it possible for a non-professional athlete to become World Champion, against all odds.

# JACQUELINE LAFRAMBOISE

*CANADIAN ARMED FORCES*

## Country:

Canada

## Institution:

Directorate of Fitness, Canadian Forces Morale & Welfare Services.

## Current Function:

Senior Research Officer Human Performance Research & Development

# Using a Sports Performance Model to Build a Military Tactical Athlete Readiness Program

**JACQUELINE LAFRAMBOISE, MICHAEL STOLBERG, BARRY STOCKBRUGGER, AND CASSANDRA SPARKS.**

Directorate of Fitness, Canadian Armed Forces

**Introduction**: Canadian Armed Forces Patrol Pathfinders (PPF) are specialized members of the Army trained for Adaptive Dispersed Operations. The 11 week PPF course is known to be gruelling and historically struggles from high attrition rates, even with screening at the unit level. The purpose of this project was to develop evidenced-based performance readiness training to better prepare candidates and help reduce course attrition rates.

**Methods**: In 2017, Human Performance research team surveyed the preparation for, and observed and measured the demands of this course while following 23 candidates. By systematically reviewing the course curriculum with the directing staff prior to and during the course, the most physically demanding days for each section were selected for observation and measurement: (1) Individual Combat Fitness (ICF) march: day 1, (2) standard operating procedures (SOP): week 1, (3) navigation: week 2-3, (4) water insert/extract: week 3, (5) rappel tower: week 6, and (6) final training exercise (FTX)- week 9. Pre-course preparation questionnaires were used to identify key performance indicators of course success. In addition, information related to course prerequisites, Canadian Army Mission Ready Performance Triad criteria, and reasons for pre-screening applicant elimination were identified.

**Results**: Using the information gained from the course review, a 1-year Performance Readiness Program and Poster was developed to create early awareness of the requirements and demands of the PPF course, thus providing the opportunity for the ideal performance preparation situation. This poster includes: an infographic highlighting the physical fitness, military training prerequisites, personal readiness recommendations, guidance/support links and the physical demands of the course all within a timeline; an assessment of performance and personal readiness (not ready - ready for

PPF); guidance for the physical fitness training program through 3 phases (foundation, specific and taper). The physical fitness program has been translated into a mobile App available to all applicants, and guided by our Fitness professionals.

These phases have been shown to be crucial for success in the specific stages of physically and psychologically demanding tasks (Corcoran & Bird, 2009; Deweese et al., 2015). Within this program, and similar to high performance sport, an Integrated Support team made up of at least a Patrol Pathfinder and Physical Fitness Professional have been identified and trained on each Army base to support the Performance Readiness Program. Additional resources include Health Promotion and Reconditioning Specialists who can provide additional sport nutrition and social/mental wellness training.

**Discussion and Conclusions**: The framework for this model is rooted in high performance sport development. Ongoing program evaluation of this recommended program is in place to assess its effectiveness by tracking the following: physical fitness preparation, participation in PPF pre-course or similar, use of support network for PPF candidates, attrition/success on course and injuries.

**Practical Implications**: Work has begun to apply this model to other Canadian army trainees with the desired outcome of increasing the number of military candidates that complete the training cycle.

# JAMIE COLLINS

*CANADIAN ARMED FORCES*

## Country:

Canada

## Institution:

Personnel Support Programs, Canadian Special Operations Forces Command.

## Current Function:

Mental Performance Specialist

# What makes a team greater than the sum of its parts.

**JAMIE COLLINS.**

Personnel Support Programs, Canadian Special Operations Forces Command.

**Introduction:** There are numerous examples of elite sports teams who performed well above that which was expected given their perceived skill and ability. This phenomenon is arguably due to effective team processes, which are the actions that allow teams to turn initial resources into shared performances (Marks et al., 2001). Unfortunately, few evidence-based resources and guidelines exist to guide coaches, athletes, and practitioners in developing the effective processes necessary for optimal performance.

**Methods:** In order to better understand the factors and strategies involved in optimal team functioning, and therefore what it takes for a team to be greater than the sum of its parts, a grounded theory study (Charmaz, 2006) was conducted. Participants were members of 19 Canadian high-performance curling teams. Focus groups were conducted with each team of athletes (N=78 athletes) and individual interviews were held with team coaches (N=10). An iterative data collection and analysis process led to the development of the Optimal Team Functioning (OTF) model (Collins & Durand-Bush, 2018).

**Results:** The OTF model represents the factors that must be enhanced for optimal team functioning and consists of eight components: (a) Individual Attributes, (b) Team Attributes, (c) Foundational Process of Communication, (d) Structural Team Processes, (e) Individual Regulation Processes, (f) Team Regulation Processes, (g) Context, and (h) Desired Outcomes. Within these components are four attributes (e.g., individual sport competencies and characteristics, relationship characteristics) as well as 17 processes (e.g., communicate, create norms, exert self-control, make decisions). Linked to the components of the OTF model are 155 strategies that coaches and athletes in the study used to enhance teamwork (e.g., create a team contract, journal, implement pre-performance routines, establish a support team; Collins & Durand-Bush, 2016).

In an effort to enable coaches, athletes, and sport practitioners to develop and maintain optimal team functioning, a periodized approach to team functioning was proposed; it is grounded in the OTF model and associated strategies (Collins & Durand-Bush, 2016; 2018). This approach consists of concrete, systematic, evidence-based guidelines (Collins & Durand-Bush, 2016) and aims to take the guesswork out of working with teams. Key strategies are identified as important during the pre-season, in-season, and post-season phases.

**Conclusion:** Coaches, athletes, and support staff can all play key roles in developing high-functioning teams - teams that are greater than the sum of their parts. However, developing and sustaining OTF requires effective planning, monitoring, and evaluation. In order to facilitate this process, a periodized approach to the timing of key strategies can provide helpful guidance.

*5 th SESSION*

# MANAGEMENT AND PARTNERSHIP INSIDE THE MILITARY SPORT FIELD

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# LUIZ FERNANDO MEDEIROS NÓBREGA

***BRAZILIAN ARMY LT. COL.***

## Country:

Brazil

## Institution:

Brazilian Army

## Background:

Bachelor's degree in Military Sciences from the Military Academy of Agulhas Negras (AMAN, 1991); - Undergraduate in Physical Education from the Physical Education College of the Brazilian Army (EsEFEx, 1994), Postgraduate Certificate in Sports Science, with emphasis on sports training at Institute Porto Alegre (IPA, 1998), Postgraduate Certificate in Advanced Sport Management Course at International Olympic Committee (IOC, 2016), Postgraduate Certificate in Policy and Strategy Advanced Course in Brazilian War College (ESG,2017), Master of Science in Human Kinetics at the University of Castelo Branco (UCB, 2005) and Master 's degree in Military Sciences (ECEME, 2011). Specialization in Policy and Strategy Advanced Course in Brazilian War College. Commander of the Physical Education College of the Brazilian Army (2015/16). He currently holds the position of Sports Director of the International Military Sports Council (CISM).

## Current Function:

CISM Sports Director

# CISM contributions to peace

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## ABSTRACT

Sport is recognized as an important tool in the context of development and peace. Studies deal with the role of sport as a means of education, conflict prevention or even solving global problems such as poverty, social exclusion and human rights violations. The International Military Sports Council (CISM) is an international sports organization whose goal is to bring together military from its 140 members nations, meeting each other in different sporting events with a goal to contribute to peace in the world. The objective of this study was to describe some of the contributions of the CISM to peace along with exploring its future role in this issue in the view of its member countries. The instrument used in the investigation were documents conserved in the CISM HQ and the application of a questionnaire in forty-five nations.

Based on the findings, the CISM recommends to find potential countries to host similar events like the Futsal Cup for Peace, training camps or events in a country/zone in conflict jointly with others institutions; plan and implement a “Sport for Peace Seminar”; institute the promotion of the theme Sport for Peace and its message in CISM competitions, platforms and events in coordination with the host nations; include the theme in the agenda of the CISM Academy along with the implementation of its own education program on Sport, Development and Sustainable Peace.

**Keywords:** Sport for Peace. CISM.

## RESUMO

O esporte é reconhecido como um instrumento importante no contexto do desenvolvimento e da paz. Estudos tratam do seu papel como meio de educação, prevenção de conflitos ou mesmo na solução de problemas mundiais como a exclusão social e violação de direitos humanos. O Conselho Internacional de Esportes Militares (CISM) é uma organização internacional de esportes cujo objetivo é reunir militares de seus 140 países membros de todo o mundo, se encontrando em diferentes eventos esportivos, de forma a contribuir para a paz no mundo. O objetivo deste trabalho

foi o de descrever algumas das contribuições do CISM para a Paz, explorando seu papel no futuro nessa questão na visão de seus países membros.

Para tanto, utilizou-se como instrumento a investigação em documentos conservados no QG do CISM e a aplicação de um questionário em quarenta e cinco nações. Baseados nos achados o CISM recomenda encontrar países em potencial para sediar eventos similares como a Copa Futsal pela Paz, campos de treinamento ou eventos em um país / zona em conflito em conjunto com outras instituições; planejar implementar um “Seminário Esporte para a Paz”; Instituir a promoção do tema Esporte pela Paz e sua mensagem em competições, plataformas e eventos do CISM em coordenação com as nações anfitriãs; incluir o tema na agenda da Academia do CISM; implementar seu próprio programa de educação sobre Esporte, Desenvolvimento e Paz Sustentável.

**Palavras-chave:** Esporte. Paz. CISM.

**Introduction:** Sport has historically played an important factor in peace building process. Studies deal with the role of sport as a means of education, conflict prevention or even solving global problems such as social exclusion and violation of human rights (Mataruna-Dos-Santos, 2018, Nóbrega, 2018; **Nóbrega et al, 2018;** Alrashid, 2017; Hancock *et Al.,* 2013; Dyck, 2011; Schulenkorf, 2010; Beutler, 2008).

The International Military Sports Council (CISM) is the sole organization able to bring together militaries from all nations to share experiences in sports fields, instead of battle. One of the main goals of CISM is “peace through sport” the aim of which is to create friendly relations between members of the Armed Forces. It is a strong motive and a great opportunity to increase contacts among military sportsmen and sportswomen within CISM, due to the power of sport to bring about positive social change. The purpose of this paper was to describe some of the contributions of the CISM to peace. It explores the future role in this issue in view of its member countries.

**Methods:** This study is a descriptive research that used the Survey of Sport and Peace Initiatives (SSPI) developed to follow up the initiatives of the 140 members according to the continents – Africa (n=47), America (N=19), Asia (N=32) and Europe (n=42) as an instrument for the investigation. It also used the documental analysis from the internal archive conserved in the CISM Headquarters (CISM HQ). The survey was conducted during the 71st CISM General Assembly & Congress - 2016 which was held from 25th April to 1st May 2016, in Tartu, Estonia. The sample is composed of forty-five nations participating in the General Assembly (see, Table 1).

**Results:** Nowadays, the CISM is working towards several activities on behalf of peace and sport, like the International Day of Military Sports (former CISM Day Run for Peace), CISM Futsal Cup for Peace, CISM Summer and Winter Games and CISM Championships. In the past, a project was developed titled “Open the gates of the barracks and bring the children in” using a similar project in Brazil as a model. CISM also organized CISM East Asia Judo Championship and Sport for Peace Seminar/Forum in Montava (Italy, 2005), Hyderabad (India, 2007) and Aosta Valley (Italy, 2010) that resulted in a creation of declarations, recommendations and call for actions summarizing the common wishes and asking all the institutions to formally establish a bilateral and mutual agreement in order to undertake concrete programs aimed at sharing good practices and effectively implementing Sport and Peace Programs.

With the intention of exploring the future role of CISM in Sport and Peace in the view of its member nations, the CISM HQ did an inquiry about this subject in the General Assembly 2016. The responses to the questionnaire are shown in figure 1.

When asked to give examples of particular sporting activities and/or peace-oriented sports activities, some of which are currently adopted in the Armed Forces, the delegations responded: organize National Armed Force Competitions, stay in contact with the main actors in the field of Sport and Peace, prepare sport teachers and trainers for the civilian community, provide sport activities for less privileged people, include sports in Peace Missions, organize friendly matches with neighbouring countries, host training camps to the national teams, strengthen the links between the military and civilians, organize a working group for scientific studies on this subject, keep programs like CISM futsal Cup for Peace and International Day of Military Sports, promote sport events in post-conflict areas/United Nations Operations and the teaching this subject in public and private schools.

Countries that have not implemented such activities replied that peace-keeping operations are not under CISM delegation control and a specific department in their country handled Sport for Peace.

CISM could support sport and peace looking for sponsors, set up peace project for prevention, follow the Futsal Cup for Peace example in other unstable regions, organize events and invite countries which are in a conflict area. It could also partner with UN Sport for Peace Office, drawing ideas on how to organize sport activities for the war refugees, financial and technical support, organize sport for peace projects with the troops in the peace keeping field, provide educational material and knowledge transfer to others countries.

**Discussion and Conclusion:** Since its creation in 1948, CISM has tried to sensitize people worldwide to this subject by taking parallel actions to its sports and administrative events. The results of the study corroborate the findings of Alrashid (2017) that sport can be a powerful tool for promoting peace, both globally and within communities, as well as preventing conflict and being an element in building a sustainable and peaceful environment. In post-conflict environments, they can reduce tensions and generate dialogue.

When practiced on peace missions in post-conflict areas among less privileged people, it could achieve benefits such as those highlighted by Dyck (2011) as a gradual reduction in the level of direct violence among young men; greater interaction on the football field between youth and local community teams in the process of disarmament, demobilization and reintegration.

For Schulenkorf (2010), sporting events if strategically designed, allow the establishment of interpersonal friendships and the creation of inclusive social identities. This is the case for projects implemented by CISM such as International Day of Military Sports and CISM Futsal Cup for Peace. They can create “moments of union” for members of different ethnic groups, nations, civilians and military, and as such, can contribute to positive social change. However, they need to be integrated into a larger socio-political support agenda to make a significant contribution to reconciliation and peace in divided societies.

Sport projects could be run in diverse ways such as a quick impact event (International Day of Military Sports), a medium-term event (tournament), or a long-term event (social inclusion program). As CISM has been organizing different sports events for more than 70 years, it has cumulated experience and has developed a broad communication network throughout the world.

**Practical implications:** This paper underlines the importance of CISM’s outreach, which together with other international organizations, can contribute to world peace. Presumably, the Armed Forces can obtain benefits in the peace efforts because of their structure, logistic and military methodology. CISM, linked with both sports system and Armed Forces, when taking into consideration its potentialities, can be an important player in the world and sport peace movement.

CISM is willing to provide any kind of advice and assistance to military commanders in peacekeeping missions, if military mission abroad is engaged to organize a sporting event. Thus, the military and local inhabitants could both profit from this collaboration. The CISM General Secretariat can help units in mission areas to get in touch with CISM delegations to receive their support, depending on individual case and potential of particular situation.

Exploring its future role in this issue in the view of its member countries, CISM recommends to find potential countries to host similar events like the Futsal Cup for Peace training camps or events in a country/zone in conflict jointly with others institutions like UN and IOC; plan and implement a “Sport for Peace Seminar”; institute the promotion of the theme Sport for Peace and its message in CISM competitions, platforms and events in coordination with the host nations; include the theme in agenda of the CISM Academy and implement its own education program on Sport, Development and Sustainable Peace.

**References:**

Alrashid, S. A. A. (2017). Harnessing the power of sport for management reconstruction management and peace building in post-conflict: Towards social integration achieving the millennium development goals. Journal of Current Research, 9(11), 60781-60789.

Beutler, I. (2008). Sport serving development and peace: Achieving the goals of the United Nations through sport. Sport in society, 11(4), 359-369.

Dyck, C. B. (2011). Football and post-war reintegration: exploring the role of sport in DDR processes in Sierra Leone. Third world quarterly, 32(3), 395-415.

Hancock, M., Lyras, A. & Ha, J. P. (2013). Sport for development programs for girls and women: A global assessment. Journal of Sport for Development, 1(1), 15-24.

Mataruna-Dos-Santos, L.J (2018). Concepts of Peace and theorical innovative models for the management of projects and sports actions. In: Mataruna-Dos-Santos, L., Helu, H.; Morales, K.C.N.; Cota, G. (Org). Sport for Peace in Mexico. Ciudad de Mexico: Comite Olimpico de Mexico.

Nobrega, L.F.M.; Santos, S.C.; Mataruna-Dos-Santos, L.J (2018). Military forces and its proposals of Peace with the use of sport in the resolution of conflicts and post-conflict Actions. In: Mataruna-Dos-Santos, L., Helu, H.; Morales, K.C.N.; Cota, G. (Org). Sport for Peace in Mexico. Ciudad de Mexico: Comite Olimpico de Mexico.

Nóbrega, L. F. M (2018). Contribuição do Esporte para a Paz e a Resolução de Conflitos. Anais do 10o Encontro Nacional da Associação Brasileira de Estudos de Defesa. FFLCH/USP.

Schulenkorf, N. (2010). Sport events and ethnic reconciliation: Attempting to create social change between Sinhalese, Tamil and Muslim sportspeople in war-torn Sri Lanka. International review for the sociology of sport, 45(3), 273-294.

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# Composición corporal y su relación con el rendimiento deportivo del equipo de pentatlón aeronáutico militar de la Fuerza Aérea Ecuatoriana

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**Resumen:** El equipo de Pentatlón Aeronáutico Militar de la Fuerza Aérea Ecuatoriana, que forma parte de la Federación Deportiva Militar del Ecuador (FEDEME) y ésta a su vez, al Consejo Internacional de Deportes Militares (CISM); ha participado desde hace 10 años en esta disciplina deportiva y se encuentra en un proceso de evolución paulatino, por lo que el propósito de este estudio fue identificar la incidencia morfológica de la composición corporal y somatotipo, en el rendimiento deportivo de los atletas, a través de evaluaciones antropométricas, previo a la participación en el 56vo. Campeonato Mundial en Pirassununga-Brasil 2014.

Se utilizó el estudio de casos, fundamentado en el diseño no experimental transversal, por cuanto las muestras se las recolectó en una sola ocasión, las variables antropométricas objeto de estudio fueron: composición corporal (peso, talla, porcentajes de grasa, óseo, residual y muscular) y el somatotipo predominante; estos datos fueron procesados y analizados mediante la derivación antropométrica del somatotipo, apoyado en el método de Heath y Carter (1980). Los resultados que se alcanzaron en este estudio, fueron los siguientes: el somatotipo de las deportistas femeninas de 3-4-2, correspondiente a endomorfo-mesomorfo, con un peso de 56,5 Kg., una estatura de 158,25 cm., un porcentaje de grasa del 10,42%, y una masa muscular de 52,72%; en cuanto a los varones un somatotipo 2-5-2, correspondiente a mesomorfo balanceado, con un peso de 73 Kg., una estatura de 174 cm., un porcentaje de 9,84% de grasa y 48,21% de masa muscular.

El estudio del arte revela que no se evidencian trabajos relacionados con esta disciplina deportiva; sin embargo, existen estudios realizados por (González, Sánchez y Mataix, 2006), en relación al porcentaje de grasa en atletas de baloncesto, esgrima y natación, con una media de 6%-12% en varones y de 10% -16% en mujeres. Según Borja (2013) en sus estudios realizados en el equipo élite masculino de Pentatlón Militar del Ecuador, con pruebas similares a las de Pentatlón Aeronáutico en: natación, pista de obstáculos, cross country y tiro; se llegó a determinar que el somatotipo predominante fue de 1-5-3, correspondiente a meso-ectomorfo, con un peso de 62,69 Kg, un porcentaje de grasa de 8,29%, y una masa muscular de 48,29%.

Por lo cual se concluye en este estudio que: el porcentaje de grasa de hombres y mujeres está dentro del rango descrito por (González, Sánchez y Mataix, 2006); en relación al porcentaje de masa muscular según Borja (2013) se encuentran casi en el mismo valor, pero el somatotipo, peso corporal, estatura y porcentaje de grasa difieren de nuestro estudio, estableciendo la prevalencia de una composición corporal y somatotipo específico para las exigencias de este deporte, viéndose reflejado en el mejoramiento de las marcas en posteriores campeonatos internacionales (Lituania 2017: segundo y cuarto lugar clasificación general masculina y femenina respectivamente). La utilidad práctica es evidente al poseer el perfil idóneo de acuerdo a nuestra realidad en esta disciplina deportiva, para seleccionar futuros talentos y en los ya escogidos, generar cambios morfológicos para optimizar su rendimiento deportivo.

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# Propioception in sports

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**Abstract:** Proprioception refers to the body's ability to detect the movement and position of the joints. It is important in the movements we make daily and, especially, in sports movements that require special coordination.

The proprioceptive system is composed of a series of nerve receptors that are in the muscles, joints and ligaments, called proprioceptors.

The proprioceptors are responsible for the collection of information about changes in position and the angular velocity of a joint.

The proprioceptive system can be trained through specific exercises to respond more effectively in a way that helps improve strength, coordination, balance, reaction time to specific situations and, of course, to compensate for the loss of sensations caused after a joint injury. to avoid the risk of it recurring.

In addition to being a source of somatosensory information when maintaining positions, performing normal movements or learning new, either daily or within sports practice, when a joint injury is suffered, this system deteriorates producing a deficit in proprioceptive information that reaches the subject. In this way, that person is more likely to suffer another injury or also reduces coordination in the field of sports practice.

**Introduction:** The word propiocepción means in Latin: "knowledge of oneself"; so it could be defined as "the total perception we have of our body at rest or in movement".

This perception is born of the excitation of the multiple receptors located in many areas of our body such as skin, joints, muscles, tendons or inner ear; the information obtained by these is carried through the different sensory nerves to be, finally, interpreted by the higher nervous centers (brain and spinal cord).

These different receptors can be stimulated by several types of mechanical deformations (pressure, stretching, elevation, rotation, tension), which allow the person to know more or less accurately the relative position of some parts of his body in relation to others and / o of the global position of the body in space. This chain of treatment of the internal information of the body can also be called intrinsic or kinesthetic feedback. This kinesthetic mechanism is absolutely fundamental for all movements to be coordinated, both voluntarily and, more importantly, involuntarily.

It refers to the ability of the body to detect the movement and position of the joints. It is important in the common movements we make daily and, especially, in sports movements that require special coordination.

Proprioception is a connection between the activity of the skeletal, muscular, and articular system with the brain. It allows us to know the position of our members and the head in space and know how they are moving, even when we are not looking at them. In this way you can perform activities automatically without having to look at them.

In short, we could imagine the proprioceptive system as the official informant of our brain regarding the location and changes of each part of the body. The purpose of this document is to know the usefulness of proprioception training in the prevention of injuries in athletes.

**Methods:** It is important to work on proprioception in the recovery of any musculoskeletal injury.

How is proprioception worked? The answer is simple: fundamentally through coordination exercises, balancing, changing surfaces, making constant decisions in which the athlete has to work in situations of imbalance.

All these exercises can be carried out in a simple and effective way, always going from the simple to the complex; from the easy to the difficult and from the fundamental to the accessory. In this way the receivers are educated and reeducated so that they relay the information correctly. It must be clear that before evolving into complex exercises, we must control the simplest ones.

In the exercises, some specific methods of progression are proposed. However, at a general level, we can evolve in the difficulty of the exercises through different guidelines, such as:

• Demand a greater tension of the musculature through the use of elements such as weighted ankles, bands and elastic bands of different resistances, dumbbells, bars with weight.

• Decrease the support base: move from bipodal to unipodal support, supporting only one part of the foot (heel, toe, external and internal).

• Use irregular support surfaces: foot on ball or foam ball, mattresses of different thicknesses, boards and tilting plates, air cushions.

• Restrict the information that arrives through other systems to focus on the proprioceptors. For example, we can start the exercises in front of a mirror to help us with the visual system, then we go through the exercises without looking in the mirror and, finally, we close our eyes to restrict the visual system's affections. These are simple exercises, which try to subject the joint or joints that are injured or not, to small progressive difficulties: imbalances, exercises on stable surfaces, then unstable, with open eyes, then closed, etc.

In the world of sport it is advisable to include proprioception exercises in the training routine as prevention of certain types of joint and muscle injuries.

Proprioceptive training focuses on the restoration of balance, the dynamic stabilization of the joint, focusing on the kinesthetic trot, turns and changes of direction and prepares the athlete for specific sports activities. (Sports Gesture).

**Materials:** You can use traditional materials such as ropes, rings, Swedish banks, cones, pikes, medical balls of different textures, diameters and weights, gym balls, platforms, balance boards, bosu, tilting plates, inflatable discs, dumbbells, bands or ropes elastic tension; what is involved is to use the imagination to design varied, motivating activities that challenge the “proprioception” of the athlete or the common individual.

**Project type:** This is a prospective sports instructional. Theoretical or practical

**Results:** Through a theoretical-practical workshop we aspire to teach the variants of proprioceptive exercises in order to be introduced in the high performance training program with the purpose of preventing injuries in athletes.

The workshop proposes three work strategies aimed at improving proprioception in the following way:

• Exercises for ankle and foot injuries

• Exercises for knee injuries

• Exercises for hip injuries

It is proposed that once proprioceptive training is introduced in sports practice, it should be done at least 3 days a week with a duration of 20 to 30 minutes per session, which could be taken into account as an initial part of the work raised by the coaching staff, since it is not advisable to work at the end due to joint fatigue, since there is a better perception with the joints resting. The number of exercises ranges from 5 to 10 each day, always starting with the simplest to progressively increase the difficulty, with 30 repetitions and a duration of each repetition of 20 to 30 seconds.

It is recommended to vary the exercises between sessions to ensure that all joints receive the benefits of the program. The exercises will be developed starting from the principle of individualization and the systematic grading of the load.

Exercises will be carried out with body weight, with free weights, thera-band, thera-ball, unstable cushions, springs, regular surfaces, irregular surfaces, stable and unstable surfaces, among others.

Once the proprioceptive training program has been introduced, it must be controlled by physiotherapists and kinesiologists and supervised by the medical staff.

Ultimately, the program seeks to generate defense mechanisms that help the athlete to meet the high demands of competitive sport with the least possible risk of injury, which will logically result in an increase in their sporting performance.

**Discussion and conclusion:** Athletes in our environment are prone to osteomuscular injuries.

• In the literature, there is scientific evidence that the specific training of proprioception reduces the appearance of injuries during sports practice.

• Reliable methods are needed for the quantification of proprioception in individuals.

• In Ecuador, there are no published studies on the benefits of proprioception in athletes.

• It is the responsibility of the interdisciplinary group to promote the practice of proprioceptive training.

• There is not yet a protocolized method of proprioception training.

**Practical implications:** The direct participants of this workshop will be professionals related to physical culture, sports coaches, physical trainers and physiotherapists, who will receive appropriate instructions on how to perform proprioceptive training and at the same time become direct beneficiaries, along with athletes in whom apply this type of training.

By knowing the principles of proprioception and its application in the sports field, it will be very important that this effective guidance to the participating professionals be used to reduce the risk factors of injury to which the athletes may be exposed and take corrective measures necessary to avoid future complications that may be more difficult to treat.

In general terms, it can be affirmed that the results obtained in this project will be effective and also make it a sustainable project, since this sustainability gives the perspective that the project, or some of its components, can continue to operate beyond the planned time developing more events of this type in the rest of the country, so that this methodology is available to other sports professionals, to whom, for different reasons they are difficult to know, so that in the near future, The experience gained in this first work will serve as a basis to continue applying it as a pilot project, to advance then to become a project on a larger scale, covering other instances, not only locally, but to reach other sectors of the country.

**References:**

Buz Swanik Ch, Harner ChD, Lephard SM, Driban JB. Neurofisiología de la rodilla. En: Insall & Scott (2004). Cirugía de la rodilla, Tomo I, 3ª ed. Buenos Aires: Médica Panamericana.

Caraffa A, Cerulli G, Projetti M, Aisa G, Rizzo A (1996). Prevention of anterior cruciate ligament injuries in soccer. A prospective controlled study of proprioceptive training. Knee Surgery Sports Traumatology Arthrosc.,

4(1), 19-21.

Childs, Jhon D. and Irrgang, James J (2003). The languaje of exercise and rehabilitation. Orthopaedic Sports Medicine: Principles and Practice. 2ª ed. Philadelphia: Saunders.

Carolin Naty Ávalos Ardila y Javier Alirio Berrío Villegas. "Evidencia del trabajo propioceptivo utilizado en la prevención de lesiones deportivas". Monografía realizada para optar el título de Especialista en Educación Física: Mesión: Entrenamiento deportivo. Medellín, Colombia, 2007.

Garrido J, Pineda Y, Piñeros A, Rodríguez MA (2003). Imbalance muscular como factor de riesgo para lesiones deportivas de rodilla en futbolistas profesionales. Acta Col Med Dep. Internet:

http://amedco.encolombia.com/deporte1091imbalance.htm

Guillou E, Dupui P, Golomer E (2007). Dynamic balance sensory motor control and symmetrical or asymmetrical equilibrium training. Clin

Neurophysiology. Feb, 118(2), 317-24.

Griffin, LYE (2003). Neuromuscular Training and Injury Prevention. Clin

Orthop Relat Res. Apr, 409, 53-60.

Heidt RS, Sweeterman LM, Carlonas RL, Traub JA, Tekulve FX (2000).

Hewett TE, Stroupe AL, Nance TA, Noyes FR (1996). Plyometric training in female athletes. Decreased impact forces and increased hamstring torques. Am J Sports Med. Nov-Dec, 24(6), 765-73

Hewett TE, Myer GD, Ford KR (2005a). Reducing knee and anterior cruciate ligament injuries among female athletes: a systematic review of neuromuscular training interventions. Journal Knee Surgery. Jan,18(1)

Hewett, TE, Zazulak BT, Myer GD, Ford KR (2005b). A review of

electromyographic activation levels, timing differences, and increased anterior cruciate ligament injury incidence in female athletes. Br J Sports

Med. Jun, 39(6), 347-50.

Mandelbaum BR, Silvers HJ, Watanabe D, Knarr JF, Thomas SD, Griffin

LY, Kirkendall DT, Garrett W Jr. (2005). Effectiveness of a neuromuscular and proprioceptive training

program in preventing anterior cruciate ligament injuries in female athletes: 2 years follow-up. American Journal Sports

Medicine. Jul, 33(7), 1003-10.

Osorio JA, Clavijo MP, Arango EF & cols (2006). Lesiones deportivas: ¿cuáles son?, ¿cómo ocurren?, ¿por qué se presentan? Universidad de Antioquia, Facultad de Medicina. Artículo en proceso de publicación.

Ruíz, Francisco Tarantino (2004). Propiocepción: introducción teórica.

Internet:www.efisioterapia.net/descargas/pdfs/

Ruíz, Jesús (2001). El esquema fisiológico del equilibrio.

Internet: www.otorrinoweb.com/_izquie/temas/05.1equi/esquema_2.htm.

Saavedra MP, Coronado ZR, Chávez AD, Díez GMP (2003).

Relación entre fuerza muscular y propiocepción de rodilla en sujetos asintomáticos. Rev Mex Med Fis Rehab, 15(1), 17-23.

Wojtys EM, Huston LJ, Taylor PD, Bastian SD (1996). Neuromuscular

adaptations in isokinetic, isotonic, and agility training programs. Am J Sports

Med. Mar-Apr; 24(2):187-92

Saavedra MP, Coronado ZR, Chávez AD, Díez GMP Relación entre fuerza muscular y propiocepción de rodilla en sujetos asintomáticos. (2003).

Ahonen, J., Lahtinen, T., Sandstrom, M., Pogliani, G., Wirhed, R. Kinesiología y anatomía aplicada a la actividad física. 2ª edición. Paidotribo, Barcelona. (2001)

Anderson, O. Can proprioceptive training reduce your risk of injury? Sports Injury Bulletin, nº 17, pág. 1-8 (2002).

Lephart, S.M., Pinciviero, D.M., Rozzi, S.L. Proprioception of the ankle and knee. Sports Medicine, 25, 149-155. (1998).

Powers, S.K., Howley, E.T. Exercise physiology: theory and application to fitness and performance. 4ª edición. McGraw Hill, New York (2001).

Lephart, SM, Myers JB, Riemann BL. Role of proprioception in functional joint stability. En: DeLee, Drez & Miller. Orthopaedic Sports Medicine: Principles and Practice, 2a. ed. Philadelphia (2003).

Mel C. Siff; Yuri Verkhoshansky. “Super entrenamiento”. Ed. Paidotribo (2000)

Vladimir N. Platonov; Marina M. Bulatova. “La preparación física”. Ed. Paidotribo. 4ª edición (2001).

Ricardo Mirella. “Las nuevas metodologías del entrenamiento de la fuerza, la resistencia, la velocidad y la flexibilidad”. Ed. Paidotribo. (2001).

Owen Anderson. “Proprioceptive training exercise routines programme to increase strength, balance, agility, coordination and prevent sports injuries”.

www.sportsinjurybulletin.com

www.efisioterapia.net

Owen Anderson. “Proprioceptive training programmes can improve muscle strength, coordination, balance, reaction times and help avoid injuries”.

www.sportsinjurybulletin.com

www.ualberta.ca/~aprochaz/hpage.html

http://www.fisioterapiavalencia.es/

http://www.corredores-populares.es

Tarantino Ruiz Francisco ¨Propiocepción: Introducción teórica¨. En www.efisioterapia.net.

Dantas Martin Henrique Estelio ¨Flexibilidad en el entrenamiento¨. En www.efdeportes.com

# ZINTZ THIERRY

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## Country:

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## Institution:

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## Background:

(Université catholique de Louvain), Demeulemeester Camille (Université catholique de Louvain), Lefebvre Arthur (Université catholique de Louvain), Helsen Kobe (KU Leuven), Corthouts Joris (KU Leuven) & Scheerder Jeroen (KU Leuven)

# Innovation for developing human capital & resources in sport federations
# Perspectives for sport in the CISM context

**ZINTZ THIERRY**

Université catholique de Louvain

**Aim and Research Questions:** Good Governance (GG) is a subject of broad interest as more and more examples of bad governance are emerging in society . In recent years, the international world of sport has been challenged by governance issues. This study aims to determine to what extent sports federations (SFs) in Belgium are governed according to the principles of GG in an innovation context (Scheerder & al., 2019; Zintz & al., 2019; Zintz & al., 2018).

## Theoretical Background and Literature Review

**Governance:** Good governance covers three main questions, namely (1) how an organization fixes strategic goals and develops its actions, (2) how the board controls the organization performance in order to reach its strategic goals, and (3) makes sure the management is acting in the interest of members.

**Innovation:** Innovation sounds as the production, adoption, assimilation and exploitation of something new with added value in the economic or social domains. It entails renewing or expanding products, services or markets; developing new production methods; adopting new management methods. Scheerder and al. (2016) suggest three innovation dimensions in the sport sector, namely product-oriented, social, and organizational innovation.

**Governance and innovation:** Three main determinants of innovation are put forward, namely managerial, organisational and environmental levels (Damanpour 1 al., 2006, 2008; Frambach & al., 2002). The managerial level refers to governance while considering individuals in the organisation, their relationships with each other, their involvement in the decision-making processes, and their leadership.

**Research Design, Methodology and Data Analysis:** A specific research design was developed by applying both an online survey (RR: 26.9% - 42 SFs) and observational analysis (RR: 98.7% - 154 SFs). As SFs may under- or over-estimate themselves in the self-evaluation survey, the observational analysis is crucial. One-way ANOVAs were used to investigate the differences in good gover **ion**

**Governance Index (GG Index):** Results show that SFs have a higher score for democracy aspects than for solidarity. Moreover, larger and Olympic SFs have a higher GG score compared with their smaller and non-Olympic counterparts. Moreover, in Flanders, a decree requests SFs to put a particular focus on GG.

**Innovation Index (I Index):** Results show that 94% of SFs in Belgium have their own website, 67% communicate by means of their own Facebook account, and 40% of them communicate on innovations. On the other hand, only 16% of SFs in Belgium have an online shop, 8% communicate on the existence of a person or commission dedicated to innovation and 8% acknowledge the existence of a mobile application.

**Combined Good Governance and Innovation Index (GGIS Index):** The GGIS Index was calculated based on the 42 SFs involved in both the survey and the observational analysis. The size of the SF seems to have very little influence in the GGIS Index, even if the scores of small federations are lower than those of other SFs. Younger SFs have higher GGIS scores than older ones. Being an Olympic or a non-Olympic SF has no influence at all on the GGIS scores. It also seems that single-sport SFs have lower scores than others. Competition between SFs does not seem to influence the results.

**Conclusion, Contribution and Implication:** The results provide policy makers with an image of the state of good governance and innovation in Belgian SFs. Moreover, SFs can use the findings of this study to enhance their governance. The major strength of this study is to combine the analysis of good governance and innovation, with the possibility to establish comparisons across time (2014-2018-2020). Nevertheless, results should be contextualized in the specificity of Belgium's sport landscape where regional policies may differ a lot.

**References:**

Australian Sports Commission (2012). *Sports Governance Principles.* Retrieved from https://www.sportaus.gov.au/__data/assets/pdf_file/0011/686036/CORP_33978_Sports_Governance_Principles.pdf

Damanpour, F. and Schneider, M. (2008) *Characteristics of innovation and innovation adoption in public organizations: Assessing the role of managers*, Journal of Public Administration Research and Theory, Vol. 19, No. 3, pp.495-522.

Frambach, R.T. and Schillewaer, N. (2002) *Organizational innovation adoption. A multi-level framework of determinants and opportunities for future research*, Journal of Business Research, Vol. 55, No. 2, pp.163-176.

Scheerder, J., Claes, E., & Thibaut, E. (2016). *Barometer van sportfederaties in Vlaanderen: de uitgebreide resultaten. Onderzoek naar bestuurlijke, innovatieve en dienstverlenende aspecten op basis van de Leuvense GGISS-index.* Sport, Policy & Management Studies n° 27. Leuven: KU Leuven, Policy in Sports & Physical Activity Research Group.

Scheerder, J., Helsen, K., Corthouts, J., Zintz, T. & Demeulemeester, C. (2019). *Delta Barometer Goed Bestuur en Innovatie in de Sport. Naar een Berekening van de Good Governance & Innovation in Sport Index (GGIS)).* Sport, Policy & Management Studies n° 58. Leuven: KU Leuven, Policy in Sports & Physical Activity Research Group. Louvain-la-Neuve : UCLouvain, Chaire Olympique Henri de Baillet Latour & Jacques Rogge en Management des Organisations Sportives.

Zintz, T., Demeulemeester, C., Scheerder, J., Helsen, K., & Corthouts, J. (2019). *Baromètre Delta de la Bonne Gouvernance et de l'Innovation en Sport. Développement du Good Governance & Innovation in Sport Index (GGIS).* Études Gestion & Management du Sport n° 59. Louvain-la-Neuve: UCLouvain, Chaire Olympique Henri de Baillet Latour & Jacques Rogge en Management des Organisations Sportives. Leuven : KU Leuven, Policy in Sports & Physical Activity Research Group.

# POSTERS

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# Effects of 4 weeks resistance training on vertical jump of military soccer players.

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2-Physical Education Center Admiral Adalberto Nunes, Brazilian Navy, Rio de Janeiro – RJ, Brazil.

**Introduction**: Several studies have shown the importance of muscular power in a football match and that jump training is an effective method to improve this physical capacity. Vertical impulse is a very important motor action in various sports. To improve it with strength training, it is important to take into account certain aspects related to the biomechanics of the jump and relative to the mechanisms of the force. The aim of the present study was to compare the effects of 4 weeks of resistance training on vertical jump height and muscle elasticity index data in military male soccer player.

**Methods**: Twenty seven healthy soccer player males (body mass = 80.0 ± 6.4 kg; height = 181.5 ± 4.6 cm; age = 24 ± 2 years) were volunteers to participate. Periodized resistance training in four microcycles (M) was used in this study: M1 (50-60% repetition maximum), M2 (70-80% repetition maximum), M3 and M4 (80-90 repetition maximum). In the vertical jump values the participants performed 15 minute routine warm-ups before performing the tests. Three sets per 3 repetitions were performed in random order of countermovement jump (CMJ) and squat jump (SQJ). All jumps were performed while the subjects kept their hands on their hips, with any jumps that were inadvertently performed with the inclusion of arm swing omitted and additional trials performed after 1 minute of rest. The CMJ and SQT height were used to calculate of the muscle elasticity index (EI). Normality was tested using Shapiro-Wilk normality test and as the data presented a normal distribution, we used the dependent t-*Test*. The significance level was $p \leq 0.05$.

**Results**: According to the results, SQT and E.I. values were difference significantly after 4 weeks, respectively (39.02±3.95 cm vs. 37.89±3.78 cm, p=0.009; 5.40±1.60 cm vs. 6.20±2.36 cm. p=0,013). There weren't a significant improve of CMJ (42.99±4.58 cm vs. 43.10±3.82 cm; p=0.817).

**Discussion and Conclusion**: Thus, it was concluded that the only 4-week period of resistance training for soccer was not enough to develop the physical skills necessary to execute vertical jumps, particularly in the capacity to generate muscular strength. The difference in jumps performance is thought to reflect an effective utilization of the stretch-shortening of stimulation during the countermovement jump. Therefore, training programs that consider specific functional needs based on vertical jumping performance and elastic index may be interesting in order to improve the performance of this motor ability.

**Key-words**: Resistance training; vertical jump; soccer; military

# Metabolic Risk in Brazilian Military Personnel: Sex-Specific-Differences

**MARCOS DE SÁ REGO FORTES; RUNER AUGUSTO MARSON; MARCO ANTÔNIO LIPPERT; DANIELLA REIS BARBOSA; LAISE LOURDES PEREIRA TAVARES DE SOUSA; SAMIR EZEQUIEL DA ROSA; EDUARDO BORBA NEVES.**

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**Introduction:** Two components of body weight, fat and muscle mass, arouse great interest in prediction of metabolic risks related to health. Most adipose tissue is located under the skin, and a smaller amount is located within the abdomen in lean and obese persons. The fat deposit and reduced muscle mass are usually related with the development of metabolic and health complications. DEXA is considered the gold standard technique by producing precise estimates of regional and global body composition, offering advantages over more traditional means of measurement. Health risks associated with fat mass refer to regional placement than general adiposity. The body-composition component (the division of fat mass by muscle mass) has been used to define metabolic risk in several studies.

**Methods:** A total of 214 Brazilian military personnel were evaluated, 107 males (30.6 ± 7.4 years) and 107 females (23.3 ± 3.5 years) from various Military Regions of Brazil. The dual energy X-Ray Absorptiometry (DEXA), iLUNAR-2015 model has used for the body composition. Variables obtained: Fat Mass (FM), Muscle Mass (MM). The FM / MM ratio was calculated. The cut-off points for metabolic risk were 0.31 for males and 0.39 for females. The odds ratio was calculated among individuals with indicative levels of metabolic risk of males and females (gender). Statistical analysis of the data has been performed using statistical software SPSS version 20.

**Results:** We calculated OR with 95% CI for the metabolic risk amongst Brazilian military personnel. Female group have higher OR for metabolic risk (OR 3,066, 95% CI: 1,732 – 5,427 than the male group (Table 1). The risk for developing metabolic risk was over 3-fold in female compared to male.

**Discussion and Conclusion:** Amongst Brazilian military personnel metabolic risk was significantly higher in female than male group. Fatty depositions as well as reduction in muscle mass are associated with inflammatory markers related to metabolic disorders. Weight training should be encouraged, especially among females, in order to reduce the risk of developing metabolic diseases. Further studies with the longitudinal design should be conducted to confirm the causal association.

**Table 1 –** Odds ratio value and confidence interval metabolic risk in male and female in Brazilian soldiers.

| GENDER | *METABOLIC RISK* | | *TOTAL* | Odd Ratio (IC 95%) |
|---|---|---|---|---|
| | WITH | WITHOUT | | |
| **MALE** | 50 (37.4%) | 57 (62.6%) | 107 (100%) | **3.066 (1.732 – 5.427)** |
| **FEMALE** | 78 (77.6%) | 29(26.4%) | 107 (100%) | |
| **TOTAL** | 128 | 86 | 214 | |

Odds Ratio (OR and 95% confidence interval); $p < 0,001$

# Biomarkers of cell injury in Brazilian military soccer athletes: training session responses at different season time points.

**MÍRIAM RAQUEL MEIRA MAINENTI[1]; ANDREW PITALUGA ROCHA[1]; JOSÉ MAURO MALHEIRO MAIA JUNIOR[1]; MARCIO ANTONIO DE BARROS SENA[2]; NORMA CLAUDIA DE MACEDO SOUZA SANTOS[2]**

[1]Physical Education College of the Brazilian Army (EsEFEx, Brasil)

[2]Brazilian Army Research Institute of Physical Fitness

**Introduction:** Soccer is an intermittent sports modality of high energetic demand and its strenuous routine of training and competition leads to high values of injury prevalence. However, there is still no consensus in the literature about their behavior throughout the season. Therefore, the objective of this study was to analyze the effort responses of some indirect biomarkers of cell injury in Brazilian Military Soccer players at two different season time points: the beginning and the end of the preparatory training phase.

**Methods:** Sixteen athletes of the Brazilian Military Soccer Team participated in the study, with a median age of 26 [24; 31] years and 77.35 [72.35; 82.25] kg of weight. Blood collection was performed before and immediately after training for two hours on the soccer field (80% physical and 20% technical training) in both phases of preparatory training phase. The analyzed biomarkers were: creatine kinase (CK), lactate dehydrogenase (LDH), aspartate aminotransferase (AST), alanine aminotransferase (ALT) and gamma-glutamyltransferase (GGT). Friedman test (with pairwise Wilcoxon and Bonferroni correction) was applied for non-parametric data and a two-way ANOVA for repeated measures was used when data presented a parametric distriution (SPSS, $p < 0.05$).

**Results:** Regardless of the stage of the season, there was a significant difference in the concentrations of the various markers, except for AST, before and after training. A typical example of the mentioned significant differences was for CK: 427,00 (154,00; 786,00) *vs.* 536,00 (246,25; 967,00) U/l for the beginning phase; and 272,05 (140,10; 465,18) *vs.* 411,10 (217,93; 640,95) for the end of the preparatory training phase. On the phase effect, the GGT was the only marker that showed a significant change in its concentration, from 26 (17,25; 35,00) to 23 (15,25; 27,75) U/l (pre training values).

**Discussion and Conclusion:** The increase of CK and LDH was also shown in other studies with soccer athletes and it is well stablished (Nunes et al., 2012, Mello et al., 2017). The improvement observed by lower values for GGT at the end of the season was probably due to the positive effects of physical training on antioxidant system, but it should be verified in future studies, since no antioxidant biomarker was analyzed. The physical preparation program for the Brazilian military Soccer Team succeded in preventing injuries, maintaing biomarkers of cell injury stabilized throutght the season, with even suitable improvements for GGT.

**Practical implications:** Despite so many researches have focused on CK behaviour, the present work showed that GGT is an important biomarker for chronic training adaptation and must be always in the list of analyzed biomarkers. Futhermore, the similar values for the other four analyzed variables shows that the physical preparation had been well conducted by the professional team.

**References:**

Mello R, Mello R, Gomes D, Paz GA, Nasser I, Miranda H, Salerno VP. Oxidative stress and antioxidant biomarker responses after a moderate-intensity soccer training session. Res Sports Med. 2017 Jul-Sep;25(3):322-332.

Nunes RT, Coimbra FCADR, Nogueira RA, Pinto AF, Filho MGB. Monitoramento dos efeitos agudos da carga de treinamento no futebol Rev. Educ. Fis/UEM, v. 23, n. 4, p. 599-606, 4. trim. 2012.

# Dissimilarity of mental skills of shooting sports athletes from the Army Forces

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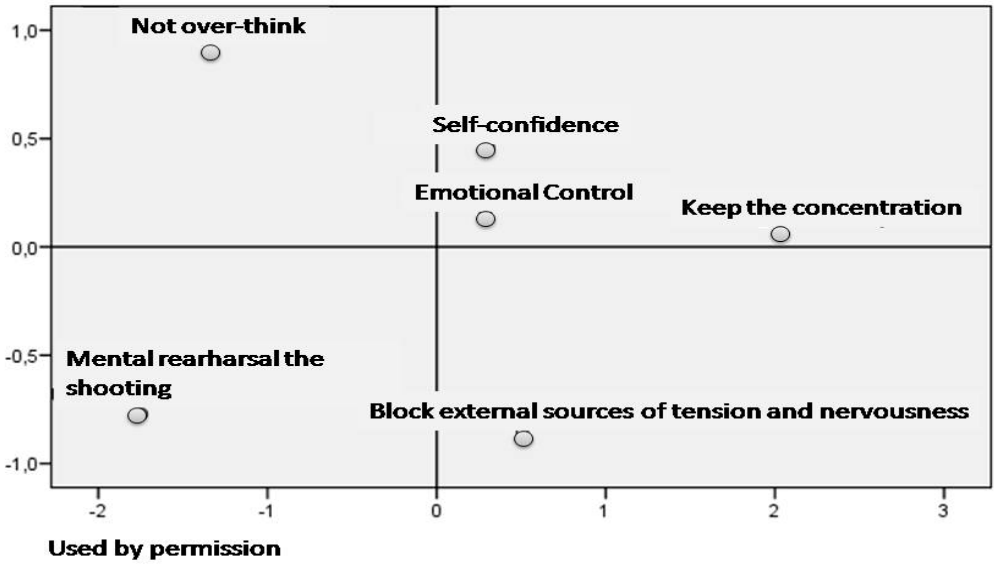
Escola de Educação Física do Exército

**Introduction:** Shooting requires a level of precision and consistency that should border on perfection, if the athlete wishes to achieve winnings. Hence, the psychologically demand among shooting sports athletes is unquestionable high. There are considerable differences between the various shooting disciplines and events in terms of psychological challenges, but over-stress, negative emotions and invasive thoughts are enemies of all shooters, whether long or short-range, specializing in static or mobile targets. Basic mental skills for shooting athletes could be summarized on six: Keep the concentration, emotional control, mental rehearsal the shooting, block external noises that may cause tension and nervousness, maintain self-confidence, and not over-think (Terry & Cei, 2014). However, how to properly address and organize their training is still unclear. The aim of this research was to analyze the shooting sport athletes' perception regarding the importance of mental skills.

**Methods:** The study design was transversal. Fourteen participants (twelve men), with mean age of 33.92 ± 8.43 years old and 12.46± 7.96 years of sport practice, from the elite team of the Brazilian Army Forces were recruited, during their preparation for the last Military World Games. They answered, voluntarily, the demographic questionnaire and the list of shooting mental skills. Athletes ordered mental skills from 1 to 6, in the order that they judged to be most important in shooting sport. Multidimensional scaling was used to test the dissimilarity of the variables, using the ASCAL model, with Z normalization and Squared Euclidian distance, considering de determination coefficient (RSQ) and stress value as indices of adjustment. SPSS version 15 was used for this analysis, adopting 95% of confidence interval.

**Results:** The subjective judgment of the importance of the mental skills allowed us to infer the distance (and the proximity) that they keep among themselves, in the view of the participants. The best adherence model had stress = .03 and RSQ = .99, indicating perfect model adherence and a 99% proportion of staggered data in the model (Figure 1).

Figure 1 – Perceptive map of the mental skills




**Discussion and conclusion:** The perceptive map points that the athletes perceive that keeping the self confidence, control their emotions and keep the concentration are the most closest skills, In this way, make sense work them together during training. On the other hand the not over-think skill, mental rehearsal the shooting and block external sources of tension and nervousness are completely distinct, and they should be trained in specific sessions, or at specify time of training. Main limitations regards on the non-probability sample and the moment of data collection. A future study with a broader sample (i.e: beginners, intermediate and elite athletes) and multiple set of evaluation (i.e.: during training, before and after completion) could generate specifics perceptive maps, for different shooting disciplines and athletes level of competition.

**Practical Implications**: this research generated evidence to guide the coach and the sport psychologist to organize the mental preparation, in a sense of what are seeing as more similar or distinct for the athletes. This could help them to improve their mental preparation and readiness to competition.

**References:**

Terry, P. C., &Cei, A. (2014).Shooting in India. In: P.C. Terry, Z. Li-Wei, K.Y. Ho, T. Morris,& S. Hanrahan (Eds).Secrets of Asian Sport psychology.(pp. 2-32). Queensland: Creative Commons Attribution.

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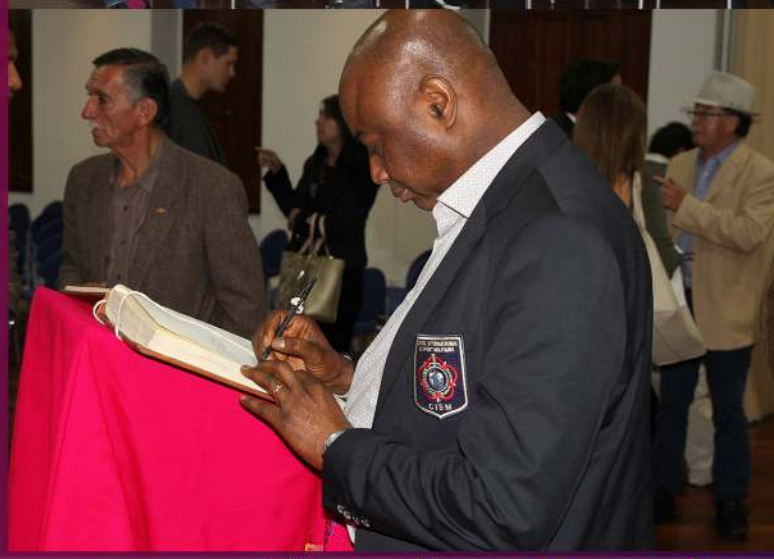

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