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Contributions on specific sports

Do the cross-country skiers selected from the national team show talent characteristics during their late teens?

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Aim: We analyze the effect of age one anthropometric and physio-metabolic characteristics in cross-country skiers selected by regional teams during adolescence, identifying which characteristics can discriminate who subsequently was selected from the national team. Method: We search in our databases female (F) and male (M) cross-country skiers that i) were selected from regional or national Italian teams, ii) came in our labs since the age of 17 years, iii) performed the same skiing maximal protocol iv) for 2/3 (F and M, respectively) to 6 consecutive years. F and M were divided into “A group” (evaluated 6 times because selected from the National team) and “B group” (evaluated 2/3 times, till the end of the regional selection) to verify the effect of age and group until late teenage. Results: in M skiers, anthropometric parameters continued to rise during the late teenage; maximal HR decreased in both M and F skiers, while V'O₂max continued to rise only in F group. Since late teenage, the A group showed higher absolute V'O₂max and maximal ventilation capacity than B group, in M skiers, while no differences between groups were found in the female counterpart. Only after teenage, energetic cost decreased significantly in the A groups. Discussion: A multidisciplinary approach would perhaps help in identifying talent in female teen-aged skiers. High absolute oxygen consumption and ventilation capacity are suggested as good indicators in male skies. After teenage, skiing improves considerably probably due to a great aerobic and technical training volume.
Analysis on the difference of aerobic capacity between male speed skaters under acute hypoxia exposure and normoxic environment

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Objective: This paper aims to compare the difference between the maximal oxygen uptake and the anaerobic threshold parameters of male speed skaters in low oxygen (2300 meters above sea level, 15.9% oxygen concentration) and normoxia, and explore the effects of acute hypoxic exposure on their aerobic capacity.

Methods: Sixteen national fitness-level speed skating male athletes were selected to perform the maximum oxygen uptake test of power bicycles in normoxia and 15.9% O2 environments, and relevant parameters were recorded.

Results: (1) The heart rate corresponding to 100W, 125W, 150W and 175w under hypoxic exposure was significantly higher than that in normal oxygen (P<0.01), which increased by 9.6%, 7.7%, 7.6% and 6.9%, respectively. Compared with the normoxic environment, the blood lactic acid corresponding to 100W, 125W and 150W in the exposed environment increased significantly (P<0.01), which increased by 20.8%, 46.5% and 37.9%, respectively. (2) The maximal oxygen uptake power and maximum oxygen uptake heart rate of hypoxic exposure were significantly lower than those in normoxia (P<0.01), which decreased by 11.79% and 3.05%, respectively. (3) The anaerobic threshold power, anaerobic threshold heart rate, and anaerobic threshold relative oxygen uptake of hypoxic exposure were significantly lower than those in normoxia (P<0.01), which decreased by 20.02%, 5.50%, and 19.13%, respectively.

Conclusion: Acute hypoxic exposure has a significant impact on athletes' aerobic capacity, which may be related to a decrease in PO2, a lack of lung ventilation, and a corresponding reduction in the amount of oxygen available to tissue cells.
Effect of HiLo on cardiopulmonary function of female short track speed skaters

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Abstract:The indexes of cardiopulmonary function before, during and after HiLo were analyzed in 16 short track speed skaters for 28 days.Methods: female athletes were exposed to oxygen in 15.9% O2 hypoxic environment for 8 hours every night. During the day, the athletes were trained in a normal oxygen environment.

Results: 1) the overall trend of morning pulse of athletes decreased (P<0.01).2) athletes’ blood pressure changes significantly (p <0.01);3)The pre-HiLo vital capacity of 3597.75±604.53ml was significantly different from the later 3774.63±567.59ml (P<0.01).4) except for a significant decrease in cardiac output, there was no significant difference in the structural and functional indexes of the heart before and after HiLo (P>0.05).

Conclusion: 1) four weeks of HiLo can improve the cardiopulmonary function of female short track speed skaters.2) four-week HiLo enhanced left ventricular systolic function in athletes and had no adverse effect on cardiac structure.
Pacing Strategy of Speedskating men's 1500 meters in Pyeongchang Winter Olympics

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**Objective:** To analyze the pacing strategy of men's 1500m speed skating in Pyeongchang Winter Olympics, in order to provide reference for athletes'physical distribution. **METHODS:** According to the data of the official website of the International Skating Union, the result of the top eight male athletes in the Pingchang Winter Olympic Games were counted and the average speed was calculated. SPSS 20.0 was used to analyze the effect of the performance of each stage on the final result. **Result:** (1) The Olympic Games which is held every four year is the most important competition for the speedskating event. Skaters from all over the world will gradually adjust their status with the Olympic Games as a big goal in order to have a good performance in the Olympic Games. From the 2013-2014 season to the 2017-2018 season, the world's best results for the speed skating men's 1500-meter shows an M-type trend. (2) For the top eight athletes in Pyeongchang Winter Olympics, the first lap time is significantly related to the final result, and the second lap time also contributes a higher value to the final result. (3) In the 1500m race, Kjeld Nuis mainly adopted the strategy of “full speed, rear speed maintenance”. The advantage of the first 1100 meters ensured the championship, though Nuis ranked last in the last lap of the top eight skaters. The drop time of each lap is 1.09±0.37s and 1.65±0.41s. **Conclusion:** In the 1500m race, the starting and the average speed of two laps are important.
Relationship between physical fitness, technical abilities and race performance in long and short track speed skaters

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In long and short track speed skating as in many other sports the competition system interferes with talent development (Capranica & Millard-Stafford, 2011; Hoffmann, 2013), i.e. coaches focus on short term outcome and fundamental movement skills and basic physical fitness are poorly developed. There is little evidence for the relationship between physical fitness (flexibility, endurance, speed, power, coordinative abilities, dynamic balance, core stability), technical abilities and race results for the age group under 18 in long and short track speed skating. Therefore multivariate correlations including seasonal bests on ice, physical parameters and scores within technical assessment will be calculated. In addition, multivariate analysis of group differences between performers and non-performers on ice are planned. We assume that not a single physical parameter is associated with better race results on ice but the complex interaction between them and technical abilities might be the key to an age appropriate athlete development (Buekers, Borry & Rowe, 2015). Young athletes need to build a broad foundation in order to improve these qualities in the following training stages and maybe even more important to protect their health, load-bearing capacity and motivation (Côté, Lidor & Hackfort, 2009). To put emphasis on long-term athlete development German Speed Skating Federation wants to establish a multidimensional selection guideline for young athletes. To be considered for selection into the German national team athletes have to a) achieve sport specific qualification time in competition; b) pass the athletic norm and c) satisfy technical criteria during competition.
GIAN SLALOM: COURSE SETTING & PERFORMANCE DIFFERENCE FROM U14, U16 TO ELITE

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Giant Slalom is the core discipline in alpine skiing. Each race has his own specific course and terrain characteristics. The International Ski Federation sets certain ranges for the course setting, specific for each age category. An adapted course setting can influence performance development. First aim is to quantify differences in course setting and performance parameters (speed, time per turn) between youth and elite athletes, females and males. Secondly, we want to reveal differences within the elite athletes, since they performed two runs on the same slope with changed course settings.

The course setting was measured with differential Global Navigation Satellite System (GNSS). The athletes wore a portable GNSS sensor to extract parameters about their performance. In total, our sample size consisted of fifteen U14, six U16 and nine elite athletes. The elite group did two runs and the young group one run.

The time needed per turn is consistent throughout all groups. Course settings showed significantly lower values for young compared to elite in gate distance. Turning angle and horizontal distance, were significantly higher at the young girls compared the other groups. Looking at the speed, all youth groups showed significant lower velocity compared to the elite athletes. Girls showed significantly lower velocity when comparing to boys of the same age. The finding that the time needed per turn stays the same, despite differences in course setting and velocity profile, is an important factor to help developing the technical skills of youth athletes.
The prevalence of exercise-hypogonadal male condition and its influence on body composition and other blood biomarkers in elite male Nordic combined athletes.

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Background: High volumes of aerobic exercise in male endurance athletes have been associated with low testosterone (T) concentrations, known as the exercise-hypogonadal male condition (EHMC). However, the exact physiological mechanism and consequences of this condition remain undetermined. The purpose of this study was to assess T concentrations and its influence on body composition and other blood biomarkers in male Nordic combined (NC) athletes.

Methods: Subjects were twelve Japanese elite male NC athletes (age; 23.3±5.6 years). Blood samples including serum free T, complete blood count, creatine kinase and lipid-related markers were collected. Body mass, percent body fat (FAT%), fat mass (FM), and fat free mass were measured by BODPOD®. Pearson’s correlation analysis was done to evaluate the correlation between the free T levels and body composition and other blood biomarkers.

Results: The mean (±standard deviation) serum concentrations of free T was 9.0±4.5 pg/ml. Only 2 males demonstrated free T concentrations that would be considered normal (>11.8 pg/ml) and 7 males (58.3%) showed reduced free T indicating hypogonadism in Japanese criteria for late-onset hypogonadism diagnosis (<8.5 pg/dl). Free T were significantly negatively correlated with FAT% (r=-0.596, p<0.05) and FM (r=-0.626, p<0.05). Free T also tended to show positively correlation with red blood cell, hemoglobin and hematocrit, though it was not statistically significant.

Conclusion: This study suggested a high prevalence of EHMC in elite male NC athletes. Reduced T levels may account for observed higher body fat and inhibit hematopoietic function.
Detection of young talents in alpine skiing: visualization and prediction

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Studying force patterns in an alpine ski boot and correlating data with riding style and falling mechanisms

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A ski boot was assembled with 7 force sensors without influencing the basic structure of boot or binding. The recorded force patterns are aligned with a basic ski and body mount measuring system to compare speed, inclination and body position with the force patterns occurring while skiing or simulating specific body positions on an inclined ramp.

Three main reasons lie behind this effort:

• Define principal force triggers to deliver a release signal for future electro-mechanical ski bindings. Since the 70ies the mechanical principles of safety ski bindings haven’t changed a lot. Injury data also shows that injury rates declined since then apart from knee-related injuries.

There is an on-going discussion about non-releasing regarding phantom foot situations as well as backward twisting falls and accidental releasing of ski bindings in other situations. The consequences may lead to serious injuries with long-term medical problems. Knee injuries are a widespread phenomenon in alpine skiing, even concerning youth athletes, largely women.

• Receive distinct data to evaluate skiing style and technique. This is of particular interest for beginners (e.g. skiing turn release action or center of gravity behavior) as well as youth and elite ski racers.

• The sensor positioning in the ski-boot is targeted to study occurring forces on different body-related planes.
Observational study of snowboard and freestyle ski jumping parameters and their relationship to landing balance.

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Epidemiological studies on freestyle disciplines revealed that the risk of injury is increased by the practice of these disciplines. Furthermore, injuries usually occurred at jump landings. Biomechanical studies have investigated the different jump parameters, but few have focused on the technical parameters managed by the athlete. The purpose of this article was therefore to determine which parameters influenced the landing balance of a jump and to observe the differences between the types of competition and the different apparatus (snowboard or ski). The parameters studied on the 1474 jumps analyzed (753 in snowboard, 721 in ski) are the following: forward foot and direction of rotation in snowboard; orientation of the body during take-off and landing in ski; degrees of rotation, number of axes of rotation, type of competition, amplitude, grab percentage, balance airborne, balance landing in ski and snowboard. It has been observed that the risk of bad landings is significantly higher in snowboarding than in skiing. Furthermore, the risk of bad landings is significantly higher in big air than in slopestyle for both aircraft. Finally, the parameters significantly related to the landing balance were the amplitude, the degrees of rotation and the number of axes of rotation in snowboarding, while in skiing, the landing balance was significantly dependent on the amplitude and grab percentage. To conclude, it is important that these results be taken into account in the preparation of athletes in order to improve performance, but above all to reduce the risk of injury in these disciplines.
Bobsleigh and Skeleton. Sports with no chance to develop?

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Bobsleigh and skeleton are two sports that Olympic status is under threat. According to the upcoming Lausanne 2020 Youth Olympic Games and Winter Olympic Games Beijing 2022, the aim of the presentation is to evaluate chances of this sports disciplines for development.

As we know, bobsleigh and skeleton are difficult, technical and athletic sports. Moreover, these sports require not only athletes' skills, but also equipment and a specialized ice-track. All of this causes a number of barriers that do not help commercialize and popularize sport. Hence, the main questions for my presentations are: How to encourage people to participate in these sports? How to increase women's participation? How to increase the support base? How to attract players to these sports? And also, how to fit these disciplines with the problem of changing climate?

In my presentation I want to show the barriers existing in these sports disciplines. This leads me to show a possibilities and directions for development of bobsleigh and skeleton. The basis for my proposals will be the organizational changes described in the sociology of sport (i.e. Slack and Kikulis 1989, Slack and Hinings 1992, Mankowski 2016), but also those related to the mediatization (Rowe 2003) and commercialization of sport. The presentation is also based on the biographical experience of working in the Polish Bobsleigh and Skeleton Federation.
Geoporn or the power of flows

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While there are innumerable political, economic, and social processes that feed into and off of the event-spectacle-cycle, here I will unpack one of the specific ways in which geographic imaginaries are mobilized to create desire and manufacture consensus about the mega-event and its host city. As part of the process of generating event related flows of information, graphical materials accompany the written word, and together with the lived experience, structure global consciousness of events and the places where they occur. These types of representation are hiding in plain sight, yet reify the production and consumption of the event itself, masking the relations of power that have brought the event and its attendant urban and social dynamics into being. This paper will analyze the power dynamics of mediated flows associated with the Olympic Games within a framework that I call geoporn.
The long-term implications of mega-events for the provision of accessible public spaces

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One emerging theme within the mega-events literature is the ways they affect the provision, regulation and design of urban public spaces. Host cities are often keen to bring events out of traditional sporting arenas and stage them in public spaces (Smith, 2016). Parks, streets and squares are used for a growing number of supplementary occasions and facilities associated with hosting mega-events, including hospitality areas, live sites and sponsorship activations. This paper combines the work of two academics who have investigated the relationship between mega-events and urban public spaces, focusing here on the long-term significance of hosting mega-events for the provision of accessible urban public space. The authors’ previous studies have shown that events can reconfigure public spaces in a number of obvious and more subtle ways. Mega-events can be used as experiments to test new ways of controlling public space or as ‘Trojan Horses’ which allow new systems to be introduced under the convenient cover of a mega-event. The paper also emphasises how mega-events are used to transform regular public spaces into events-oriented sites, achieved via the normalisation of hosting and because mega-events provide high profile precedents which are used to sanction future events. The supposed success of a mega-event is also used as a mandate to shift public spaces towards a more commercial orientation. The paper adopts a critical perspective, but one that allows for the acknowledgment of more positive legacies. For example, the authors show how mega-events result in innovative ways of using public space.
The development of pacing behaviour of elite short-track speed skaters during adolescence: a longitudinal study.

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The goal-directed distribution of velocity (i.e. pacing behaviour) is a key component in performance optimisation and safeguarding athlete wellbeing. The current study analysed the development of pacing behaviour of skaters during adolescence, using a longitudinal design. Lap times were collected of 15-19 year old skaters performing during two or more 1500-m races during Junior World Championships between 2010 and 2018 (221 skaters, 907 observations). Races were divided into four sections (laps 1-3, laps 4-7, laps 8-11 and laps 12-14). Multilevel prediction models in which the races (level-1) are nested within the skaters (level-2) were used to analyse the effect of age on absolute section times (AST) and relative section times (RST; i.e. the percentage of total time spent in a section). Analyses were carried out in MLwiN (p<.05). Between the ages of 15 and 19, total race time decreased (-4.85s [0.89], p<0.01) and skaters reached lower AST in laps 8-11 (-2.03s [0.24], p<0.01) and 12-14 (-1.98s [0.25], p<0.01). Additionally, the RST’s of laps 1-3 (0.99% [0.25], p<0.01) and 4-7 (0.37% [0.18], p=0.04) increased and the RST’s of laps 8-11 (-0.53% [0.16], p<0.01) and 12-14 (-0.75% [0.18], p<0.01) decreased. These finding suggest that throughout adolescence, elite short-track skaters develop a more conservative pacing behaviour, reserving energy during the start of the race in order to achieve a higher velocity in the final section of the race and a decrease total race time. Coaches should take under consideration that the pacing behaviour of elite youth skaters develop during adolescences.
Beijing 2022 and its impacts on the winter sport development in China

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The next winter Olympics will be hold in Beijing in 2022 (which have hosted the Summer Olympics in 2008). It constitutes an ideal opportunity to develop the winter sport leisure and industry in the second largest world economy.

In the same time, it offers new opportunities for firms (domestic and foreign) in this sector. It is the case for the housing sector, or the ski lifts industry…Indeed, the number of ski stations is increasing (from 568 in February 2016 to more than 1000 in 2022) and the number of visitors too (from 12.5 million of people to 40 million in 2022). Chinese ski resorts are located near Beijing and in the north-east provinces of Heilongjiang and Jilin, towards the rich and growing medium class.

As a result, we study in a first part, such recent boom in the Chinese winter sport industry, its strenghts and oppotunities. The, we propose to analyze and to compare the current winter sport development in China with the same past trend followed by Japan during the 70s decade, after hosted the Winter Olympic Games in Sapporo in 1972.

Finally, we deal too with the risks behind such development, and notably the global warming consequences on the Chinese winter sport industry.
Sensor and Video Based Performance Analysis for Winter Sports

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Archinisis GmbH¹

Today, accurate sport-specific performance indicators can only be obtained at considerable costs in few research centres. Despite all technological advances, elite sport coaches still lack precise means to easily and objectively measure and monitor daily their athletes' performance. Many decisions are based on athletes' feelings and subjective coaching observations. The lack of objective data prevents coaches from fully exploiting the athletes' potential based on rigorous performance monitoring.

Archinisis develops simple-to-use and sport-specific performance measurement tools based on a single sensor worn on the upper back coupled with highly specialized analysis algorithms. The use of biomechanical models and motion constraints allows monitoring the athletes’ movements automatically and in detail. Our solution provides highly accurate sport-specific performance indicators and detailed performance analysis within seconds, avoiding tedious data review and video analysis.

During this talk, we will present you our solution for cross-country skiing, biathlon, ski jumping and alpine ski racing. Selected results from trainings and races recorded by some our customers will be presented to illustrate the possibilities our system offers.
Development of Laboratory Capacities in Chinese Endurance Athletes Participating in an XC Skiing Athlete-Transfer Program

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**Background:** Aiming for cross-country (XC) skiing success at the Beijing Olympic Winter Games in 2022, China has developed an athlete-transfer program, where athletes from various sports (e.g., running, rowing and kayaking) have been transferred to XC skiing by utilizing state-of-the-art coaching and training methods (see Sandbakk and Holmberg., 2017). The purpose of this study was to examine the performance, physiological and technical development of Chinese athlete-transfer athletes over a 6-month period.

**Methods:** After an initial 3-month introduction to XC skiing, 24 young Chinese endurance athletes’ performance, physiological and technical capacities during treadmill running, treadmill roller skiing skating and double-poling ergometry were measured at 3 different time-points during a 6-months XC ski-specific training period.

**Results:** Pre-post changes revealed no significant improvements in VO₂peak, neither in running nor roller skiing skating and double-poling. High VO₂peak/VO₂max ratios were found with skating VO₂peak and double-poling VO₂peak reaching ~94% and ~90% of running VO₂max. Performance measured as vVO₂peak in roller skiing improved by 13.2±8.4% (P<0.01), whereas vVO₂peak in running was unchanged. Average power output in a 30-sec Wingate test and 5-min performance test in double-poling improved by 5.0±6.2%, and 7.8±9.3%, respectively (P<0.01). During submaximal roller skiing, O₂-cost, heart rate and RPE were reduced by 5-13% (P<0.05), whereas gross efficiency and cycle length improved by 0.6±0.7%-points and 13.1±7.1%, respectively (P<0.01).

**Conclusions:** 6-months of specific XC ski-training improves sport-specific performance, efficiency and cycle length, but not VO₂peak in a group of Chinese endurance athletes transferring to XC skiing.
Technique analysis in german youth cross-country skiing

Eberhardt A., Fudel R.,

Institute for Applied Training Science

In XC skiing as in many other endurance sports early matured athletes are advantaged in youth elite competition systems regardless of their technical skiing skills (Stöggl et al., 2015). However, XC skiing contains many different sub techniques that are required variably at different terrains. Therefore technique is an important performance prerequisite in XC skiing (Stöggl et al., 2013). Nevertheless, youth coaches of the German Skiing Federation assess their athletes’ technical level as not sufficient for later top performances in elite sports. Therefore the aim of this study was to evaluate technical performance level of German youth elite athletes. Referred to this a valid assessment scheme will be developed which helps coaches evaluating their athletes’ skiing technique. During German Youth Cup (2019) 191 national XC skiers (14,5 yrs) were captured from sagittal view while double poling. Based on observation, three experts evaluated technical quality referring to five movement characteristics that are important for efficient propulsion: straight and forward body position at preparation phase, position of the elbows at initial pole contact, timing of upper body and arms during poling and recovery phase (Jonsson et al., 2019). Most technical deficits appeared in timing. Only 27% coordinated upper body and arm movements correctly, meaning that for the majority poling was not efficient with regard to propulsion. The outcomes help to give athletes feedback about their technical performance level. Additionally they provide a basis for improving technique training and consequently technical skiing skills of German youth XC skiers.
HOW IMPORTANT IS SHOOTING IN YOUTH BIATHLON TRAINING? A LONG TERM TRAINING ANALYSIS IN YOUTH ELITE BIATHLON

Fudel R., Eberhardt A., Otto C.,

Institute of Applied Training Science

Many world-class biathletes accomplished a successful career even though they didn't train shooting in their early youth (Carlson, 2011). Within few years/months of shooting training, they achieved a competitive performance while their technical and physical capabilities in skiing were often on a higher level compared to their opponents. The aim of the study was to investigate effects of a reduced shooting training and increased endurance and athletic training in the age from 12-14.

Seven athletes followed a modified training plan. The total number of shots was reduced by approximately 20% compared to the current training concept in Germany. Endurance and athletic training were increased by approx. 10% respectively 60%. Training data, test- and competition results were documented for (so far) three seasons.

Only two athletes enhanced their skiing performances. Most improvements happened in shooting standing. The results of the athletic tests differed individually. Although the outcomes do not (yet) allow any general deductions, the findings of the first analyses are not in accordance to our expectations. Reasons have to be discussed individually. Some of the young athletes might not have been physically prepared for a higher training load. Additional to the athletes’ data, the study showed indications about requirements in LTAD, which need to be discussed by coaches and scientists. According to the coaches, a greater reduction in training volume in shooting would be useful, but leads to conflicts with the current competition system. Consequential, competitions need to be adapted to the specifications of youth training.
Marketing Strategies to Engage Youth In Snow Sports

Delpy Neirotti L.¹

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Research first conducted in 2005 (NSAA, 2005) indicated a decline in snow sports participation and sparked a need for the snow sport industry including manufactures, ski area operators, sport governing bodies, and tourism entities to design marketing strategies to attract more people to participate in snow sports. More specifically, youth 5-12 years old are important to reach as the majority of current adult participants started skiing before the age of 12 (RRC, 2018). Despite various initiatives, the percent of visitations by teenagers today is less than in the past decade and overall participation is flat (RRC, 2019). This study reviews the various initiatives across the world that have been implemented along with reported results including Learn to Ski &Snowboard, Passport &Ski Pass Programs, Kids Ski Free, World Snow Day, and Snow Kids. As China prepares for the 2022 Winter Olympic Games, the country has a stated objective of recruiting 300 million people to experience snow sports. Efforts to achieve this are also studied. Furthermore, climate change and its impact on snow sports as well as sustainability concerns will be addressed (Scott et al., 2012; Scott &McBoyle, 2007; UNWTO, 2008). Finally, recommendations on best practices and strategies for proactive engagement by all stakeholders will be shared.
The Swiss Ski Federation, an association focused on youth?

Cala S.¹,

University of Lausanne¹

The history of skiing in Switzerland is beginning to reveal these secrets through various scientific studies. These include those of Thomas Busset on the dissemination of this practice (Busset, 2016), those of Gregory Quin on the institutionalization of ski in Switzerland (Quin, 2017 / Quin &Cala, 2019), those of Anne Romanens about the democratization of skiing and Sébastien Cala's recent work on the relationship between skiing and tourism (Cala, 2018 / Cala &Quin, 2019).

However, no institutional history work has yet been carried out, either on the Swiss Ski Federation (FSS), or on the International Ski Federation (FIS). In fact, it seems most interesting to know the history of these federations, and in particular of the FSS, which nevertheless represents one of the major sports in Switzerland. In this perspective, this work focuses on two actions that the FSS has set up in favour of young people, outside ski racing, namely: the "free skis" system which aims to collect and offer skis to children from poor families and the Juskila, a camp offered by the Federation to children from all over Switzerland.

This research is based on an unpublished corpus of archives from various unclassified collections. These include the FFS’s archives, the archives of the Sports Museum in Basel and the archives of the Ski Club Le Brassus. The information collected was cross-referenced with various documents deposited in the Federal Archives in Bern.
Effect of performance level on nGRF characteristics in Giant Slalom

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Determining external force characteristics in alpine ski racing is essential to improving the understanding of performance. During a turn, the speed, trajectory, and body inclination all can influence the intensity and direction of normal ground reaction force (nGRF). During the turns of a downhill run, specific patterns of force output might describe differences in performance. For example, maximal nGRF is negatively correlated with the race time however this finding is based on the kinematic computation of external force rather than direct kinetic measurement. This is somewhat problematic, since indirect measurement may not consider fast and high amplitude nGRFs specific to ski-snow interaction (bumps, vibration). We evaluated the effects of nGRF on turn performance, based on direct kinetic measurement from 13 mixed-level adult skiers (club to world cup competitors) on a timed 16-gate giant slalom course. nGRF was measured throughout each ski run using a validated force-plate system. We computed mean nGRF, maximum nGRF and output during the initiation of turns for the external foot and tested the predictive value of these variables to course performance. All force parameters computed were negatively correlated with race time (p<0.05), meaning the better performing athletes generally exhibited greater nGRF output. These results can be explained by turn speed inducing greater kinetic energy, and potentially a requirement for advanced muscular capacities of high-level skiers.
Contributions on specific topics

Decisive Transitions of Winter Sports’ Athletes: Insights from Scandinavia

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Scandinavian countries’ success in winter sports is largely based on their care for athletes’ development as whole persons and throughout their whole careers. Special attention is given to athlete preparation for, and support during, the decisive career transitions. The junior-to-senior athlete transition is considered as the most challenging one that often turns into a dual career transition; i.e., towards higher levels in sport and education – both of which require solid coping resources and external support. Another decisive athletic career transition is that of retirement and adaptation to the post-sport life, especially after an elite career. Speakers of this symposium will adopt a scientist-practitioner perspective to address a range of athletes’ decisive transitions. First, the junior-to-senior transition in Swedish ice hockey will be discussed based on a four-phase empirical model grounded in interview and focus groups data. Second, the elite winter sport athlete-to-coach transition in Norway will be shared based on in-depth interviews and an empirical model reflecting unique features of this transition. Third, practical experiences from working with Norwegian dual career athletes in preparation for athletic retirement will be presented. Last, a moderated discussion will focus on career support that is essential for helping athletes to develop healthy, successful, and long-lasting careers in sport and life.

NOTE: We would like to deliver a 60-minute symposium addressing the most challenging transitions experienced by youth sport athletes. There will be 3 focused presentations touching on the scientific and practical perspectives of transitions followed by a brief open discussion.
Beyond Gold

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Olympic Games are a deal for many athletes. They train every single day for four years to give the best they can. Some of them fight for a medal.

In that scenario, what comes out is the passion to struggle against many difficulties to give their best. Winning an Olympic Gold Medal is what every athlete dream. Is not only the medal, but the meaning that medal has. Being in the podium, hearing their Country Anthem while the flag rises, is the most rewarding moment of their lives. There, all the values they respect stands: speed, height, strength and also determination, courage and honesty.

But when that Gold is won also with humanity, that medal becomes an example; and the athlete, a legend. Elite athletes easily could experience success and keep it for themselves. But, when they develop caring for others, they grow as human beings. They become real icons that help to develop a better world: they share their passion bringing joy and wellness around.

Therefore, having “Olympic Legends” becomes essential in our society. We must highlight them for our youth and children, so that they overcome other lifestyles shown popular but that don’t give them what they are really seeking for: humanity.

Winter Olympics. 1998. Philip Boit and Bjorn Daehlie go down in history for being two unusual skiers. What happened? The Norwegian sportsmanship made him not only a champion, but a legend: he showed the world that the real Olympic Spirit goes \textit{beyond Gold}. 
The choice of analysing the Olympic Games of Rome 1960 and Barcelona 1992 belongs to the conflicting and diverse impact generated on the two cities. I will examine how management models will either prevent or increase the exploitation of the intangible benefits, necessarily associated to the Olympic event. Olympic venues are at the hearth of the Olympic planning, as they constitute the citizens’ Olympic legacy. My critical analysis, regarding these two mega-events, is carried out through the development of 13 guidelines, aiming to offer effective criteria in order to guarantee not only economic revenue but also intangible, future benefits. This investigation shows how cities should favour from these intangible benefits, which develop as a consequence of both, the Olympic bid’s success and the infrastructural evolution.
Biathlon is a complex sport subjected to large performance variability. Among the environmental conditions (e.g., temperature, wind, snow conditions) susceptible to influence performance, altitude is likely a detrimental factor for skiing (i.e., due to decreased aerobic capacity) as well as for prone and/or – to a larger extent – standing shooting (i.e., due to altered postural control and increased ventilation) performances. The aim of the present study was therefore to analyse the influence of altitude on elite biathlon performance.

The analysis comprised data extracted from the International Biathlon Union (IBU) website and included IBU World cups, IBU cups, IBU World championships and Olympic winter games events over eight years from season 2009-10 to 2016-17. The research included sprint, individual, mass start and pursuit competitions for both men and women (no relays). The event sites were divided into three different altitude ranges: <700 m, 700-1400 m and >1400 m. Only the Top-30 of each race were recorded for both men and women, separately, and analysed for skiing speed, prone and standing shooting performances.

The results show a detrimental effect of altitude (i.e., ~3.0% between <700 m and >1400 m) on shooting performance that was similar for men and women but without any statistical difference between prone and standing positions. Due to many other confounding factors not analysed here (snow quality, course profile), the effect of altitude on skiing speed was unclear. Overall, as expected, elite biathlon performances are altered, even within the range of moderate altitudes of the IBU competitions (<1800 m).

**Keywords:** Biathlon, Skiing, Shooting, Altitude, Hypoxia
Effectiveness of endurance training, guided by oxidative stress analysis

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The purpose of this study was to assess the effectiveness of endurance training guided by oxidative stress analysis. Twenty-three endurance athletes were randomized into an oxidative stress guided group (n=12) and a control predefined training group (n=11). At the end of the baseline wk, a performance pre-test was performed before starting a 4-wk protocol followed by a post-test. Sleep duration, oxidative stress (O2 score), subjective fatigue, training load and stress score were recorded daily. Heart rate variability (HRV) was measured 3/wk. The training adjustment in the guided group was based on individual changes in O2 score combined with the subjective fatigue. The control group followed the standard predefined training program. There was a significant (F = 2.45; P = 0.02) group x time interaction for O2 score. The average training volume was lower in the guided group in comparison to the control group (w3: P = 0.029, w4 P= 0.008). O2 scores were in both groups correlated with the training volume (R = 0.82, P <0.05), RMSSDsu (R = 0.69, P <0.05) and HRsu (R = -0.91, P <0.001). However, no performance change was observed in both groups (pre-to-post- change 0.4 vs. -0.2%). Daily individualized adjustment of the training loads based on oxidative stress stabilized O2 score in the guided group while it continued to increase in the control group. O2 score seems sensitive to training volume and direct or indirect markers of fatigue. Therefore, the redox sensor may be a practical tool for monitoring endurance training.
“Accelerating Success” shows promising opportunities for athlete career development with examples from Max Donner’s new book, “The Olympic Sports Economy.” The presentation provides an overview of entrepreneurial initiatives in sports worldwide and important benefits these are creating for both athletes and the international sports community.

“Accelerating Success” introduces key success factors which are building a good foundation for the IOC managed Athlete365 Business Accelerator as well as programs supported by universities, teams and sports organizations:
- A critical mass of talent
- Collaboration and communication skills
- Favorable industry economics
- Scalable business models
- Synergies with health care and manufacturing industries
- Value added benefits for sports sponsors
- A sports ecosystem which encourages innovation and dependable results

This presentation shares case examples of entrepreneurial endeavors in sports that put key success factors to work and built investor confidence in the industry: Lacoste, NIKE, UnderArmour, TechnoGym, Yonex, ESPN and IRONMAN. It concludes with a profile of the business initiatives of Olympic skiing champion Marcel Hirscher and his tried and tested techniques for accelerating success.
Young élite athletes’ risk awareness of the future professional sporting career.

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Research question: A professional sporting career is a highly risky project, though many young athletes aspire to become professional sportspersons. Since the invasion of business society into the field of sport, multiple agents with contrasting goals fuel these aspirations. This research focused on the question: How do young élite athletes’ perceive external forces that shape their decision to pursue a professional sporting career?

Research method: We surveyed 92 young athletes (age 15-20) studying at the Professional School for Elite Athletes in Ticino (Switzerland). For the research design a multi-method approach was chosen, combining one-on-one interviews with online questionnaire. Quantitative and qualitative analysis of data was used to identify correlations between psychosocial parameters of respondents and their perceptions.

Results and findings: The data revealed that gender, sport discipline and competition experience at international level influences athletes’ perceptions. The results showed that athletes tend to underestimate the risks of professional sport. Moreover, parents, peers and mass media might be a distortive source of information about the professional sport career. Finally, many young athletes don’t recognize social media and national élite sport system as a valuable resource in their sporting career development.

Implications: This study identified and examined several elements that could be used by young élite athletes as a basic framework to realistically assess their environment and to make more thoughtful decisions concerning their future professional careers. For individuals and institutions who assist young élite athletes in their career development, it provided a series of recommendations in order to increase athletes’ awareness.
What makes mega-events sustainable? Comparing Olympics, World Cups and Expos since 1960

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Mega-events such as the Olympic Games and the Football World Cups are often presented as sustainable policies for cities, regions and countries to boost economic growth, revamp the host’s image, attract tourists and develop infrastructure. Using a multi-dimensional definition of sustainability comprising economic, social and ecological indicators, this paper analyses unprecedented comparative evidence across 53 mega-events since 1960, covering the Summer and Winter Olympic Games, Football World Cups and Expos. It shows that sustainability outcomes vary considerably between events and proposes a ranking that distinguishes between more and less sustainable events. Through regression analysis, it establishes predictors of sustainability, both at the macro level (economic and political system, population size, corruption, wealth), at the organisational level (governance model, cost, event size, event type) and at the urban level (concentration, construction, location). The evidence shows that there is not one ‘model’ of sustainable games, but different experiences varying across a plethora of hosts that need to be discussed separately.
Monitoring of stress and recovery in junior cross-country skiers during and after a training camp

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Background
Training in cross-country skiing involves large volumes and high-intensity training, leading to considerable physical and mental stress in young skiers, including risk for overtraining and injuries. We aimed to investigate the changes in the subjective recovery-stress balance during and after a training camp and the influence of daily training load on subjective recovery-stress balance in junior cross-country skiers.

Methods
16 female and 13 male junior cross-country skiers (age: 17.5±1.1 years) completed a short- questionnaire to assess subjective stress-recovery balance during and after a training camp. Daily training load was determined using the 1-10 scale session rating of perceived exertion.

Results
Compared to the first day of training camp, a statistically non-significant trend of decrease in the stress-recovery balance score was observed over the six day training period (-3.9; -8.3; -2.8; -8.0; -10.1; all p >0.05), followed by a significant increase after four days of recovery (+16.0; p = 0.006). No or trivial correlations were found between daily training load and stress-recovery balance during the first days of camp (r = -0.27 to 0.16; all p >0.05), a moderate negative correlation was observed for the last day (r = -0.45; p = 0.017).

Discussion
In junior cross-country skiers, subjectively perceived physical and mental load during training camp appears to increase moderately over time, while the magnitude of daily training load demonstrated a larger impact on perceived stress-recovery balance towards the end of training camp. Importantly, athletes recovered within four days.
Re-thinking mega-events through a more integrated approach to divergent temporalities

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This paper aims to bring new insights into the rethinking of mega-events through a key focus on temporalities. To do so, it uses the results from several small-scale research undertaken in London (2012 Olympics), Cape Town (2010 FIFA World Cup) and Marseille (2013 European Capital of Culture). It also builds upon extensive work in the area of temporary urbanism (including in Lausanne) and specifically in how such dynamics are to be shaped within a trypic framework comprising adaptability, activation and trajectory. The key argument developed here is the need to revisit the challenges encountered in both the setting up and the legacy building of mega-events as to better embrace the temporalities of the everyday and the mega-events requirements which while being highly transformative are also by essence transient. To do so, two key theoretical framings are mobilised: Lefebvrian understandings of the everyday rhythms characterising interventions into the social and/or infrastructural elements of the urban fabric and economic-geographical analyses of path-dependency and resilience, affording insights into notions of values and adaptability. After presenting how those theories inform a trypic framework comprised of adaptability, activation and trajectory to look at mega-event and temporalities, I will illustrate my arguments by presenting the dilemmas, challenges and successes faced by London, Cape Town and Marseille. I will conclude by suggesting shifts and alternatives that could be envisaged in order to better converge contrasting temporalities into more integrated alternative event formats.
RELATIONSHIP BETWEEN HEART RATE VARIABILITY AND CORTISOL AND THEIR ASSOCIATION TO TRAINING LOAD IN YOUNG ATHLETES

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INTRODUCTION: Heart rate variability (HRV) can be utilized to monitor recovery non-invasively (Achten et al. 2003). This study explores potential relationships between HRV and circulating levels of the stress hormone cortisol, which rise in connection with exercise, as well as determine the association of these factors with training load of young elite athletes.

METHODS: Three male and five female well-trained endurance athletes (age 16±1 yrs.) were recruited from the Vuokatti-Ruka Sports Academy for this 7-week study. Cortisol levels in morning saliva were assayed and HRV recorded with a ballisto-cardiographic sleep-tracking device. Training was recorded in electronic diaries and categorized into training zones above and below the aerobic threshold.

RESULTS: HRV and cortisol levels correlated negatively at all times, and significantly so during week 7 (r=-0.879, P<0.01). Training load and HRV showed a positive correlation during week 1 (r=0.742, P<0.05) and negative correlations during weeks 5 (r=-0.720, P<0.05) and 7 (r=-0.783, P<0.05).

DISCUSSION & CONCLUSION: HRV correlated with both salivary cortisol and training load during those weeks when training was particularly intense. The similar trend in the case of cortisol versus training load was not statistically significant, suggesting that cortisol may be less sensitive to stress than HRV (although the sample size was small). The fact that the positive correlation between training load and HRV during week 1 later became negative indicates that as the load increased, full recovery required more time.

REFERENCES
The difference in subjective and objective training intensity during high-intensity interval training in junior cross-country skiers: Do mind and body tell the same story?

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Background
Heart rate (HR) monitoring and rating of perceived exertion (RPE) are two common tools to quantify internal intensity in endurance training. This study aims to investigate whether objectively measured internal intensity during high-intensity interval training reflects subjectively perceived intensity in junior cross-country skiers.

Methods
46 Swiss junior cross-country skiers (24 male and 22 female; age: 17.5 ±1.2 years) performed three different high-intensity interval sessions during a 6-day training camp. HR was recorded continuously and session RPE based on Foster et al. (2001) was measured within 30 min upon completion of each interval session. Time spent in the high-intensity domain (zone four and five) was calculated according to the typical five-zone scale used by cross-country skiers (Seiler, 2010). Pearson product-moment correlation coefficients were then calculated for time-in-zone and reported RPE for each session.

Results
No significant correlation was found between physiological time-in-zone and reported session RPE in either interval session (correlation coefficients r = -0.18 –0.10).

Discussion
The current study demonstrated no significant association between the measured objective and perceived subjective training intensity in junior cross-country skiers. While time-in-zone measurements might provide a better insight into the internal stimulus and consecutive cardiovascular adaptations, perceived subjective intensity does not appear to necessarily reflect this physiological intensity. Athletes and coaches might benefit from both training intensity measures, in order to fully capture the physiological and psychological stress of high-intensity interval training.
The development and diversification of the Olympic Games over the course of the twentieth century established a shift in the scale of their urban impact. As hosting the Games emerged as an opportunity and impetus to advance regional development plans, challenges around the long-term function and integration of venues and infrastructure began to rise. The continued growth of the Games into the 21st Century has made hosting the event a high-risk endeavour that fewer cities are willing to take on, and as a result, the necessity to develop research supporting positive long-term legacies and a more sustainable Games has been identified and established as a priority on the Olympic agenda. In recent decades, alternate urban strategies have been sought by Olympic hosts of both Summer and Winter contests. This paper interrogates existing and emerging approaches to hosting the Olympic Games, examining the concepts of reuse (e.g. Innsbruck 1964, 1976, 2012), temporality (e.g. Cortina 1956, Lausanne 2020, Skating Ovals), twin-city and supporting region bids (e.g. Milano-Cortina 2026), and the alignment of Olympic to regional development plans in the Winter Olympic context. Addressing the lack of comparative analyses in academic literature (particularly in relation to the Winter Olympic Games) the study draws focus to the implementation and outcomes of different urban approaches by examining urban strategies and long-term legacies across a range of Winter Olympic host sites and venues.
Each age recasts Olympic memories in light of its own values and needs, framing the Games in terms of imagined and reimagined pasts. That continuing process operates at two levels. Globally, the IOC operates as the global custodian of the Olympic story, with its archives and museum in Lausanne maintaining a physical and online record of the Olympic movement. However, the ambulatory nature of the modern Games presents the host cities – 25 Summer and 20 Winter Games hosts to date – with their own local challenges and objectives as to how they wish the Games to be remembered. This applies both to their individual efforts at creating Olympic museums and in the ways that memories of the Games are recorded in the built environment. The latter would include treatment of the past at major Olympic sites, on-site memorialization of the Games, and with memory as a component of legacy.

This paper considers both global and local aspects of Olympic memory. After introducing the role of memory in defining and propagating the Games, we consider, first, the process of memorialisation through the Olympic Museum (Lausanne) and global museum networks. The ensuing section uses case studies of the two Japanese Winter Games sites (Sapporo 1972 and Nagano 1998) to examine issues in local memorialisation of the Games, effectively pointing to possible areas of contestation between local and global representation of the Games. The conclusion provides suggestions as to the continuing agendas in this field of inquiry.
Mega-events for development? Seeing mega-events from the south

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In this decade, a new geography of mega-events has emerged as the strategy of event-led development has gone global with emerging economies becoming dominant players. While the ‘mega-event strategy’ has been helpful to conceptualise economic restructuring and state entrepreneurialism in Western societies (Andranovich et al, 2001) it does not fully capture how it has been appropriated in developmental contexts where other government logics are needed to understand how policies and governance are articulated (Le Galès, 2016). A ‘Southern perspective’ which can account for the conflicting rationalities of delivering ‘world-class’ event facilities with competing developmental demands is required (Watson, 2014).

The prospect of improving infrastructure and the environment has reinforced the idea that mega-events ‘provide a powerful catalyst for cities and countries to invest in the future, with tangible and significant benefits’ (IOC, 2015:48). Despite attempts to provide a framework to measure event legacy (Preuss, 2018) few studies have sought to validate such claims especially in the medium (>5 years) or longer-term (>10 years). There is also a distinct lack of comparative analyses across different types of events with minimal international learning (Müller &Gaffney, 2018) and little attention given to experiences in developing countries. This paper will reflect on the experiences of mega-event hosting in the Global South and suggest topics for comparative analysis.
Sport psychological support of young elite athletes at the athletic retirement: An individual case study

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Introduction: Although the challenges and risks of athletic retirement have been well studied, little attention has been paid to the practical application. Based on an individual case study, challenges athletes can be confronted with are described. This study tries to explore how retirement can be best accompanied from a systemic psychological view.

Methods: A systematic individual interview was conducted, which was based on the Athletic Career Termination Questionnaire (ACTQ) (Küttel et al., 2017). The athlete's answers were paraphrased and a content analysis was conducted.

Results: Missing qualifications, performance limits and motivational problems were the key factors to stop elite sport at the age of 22. The athlete reported adjustment difficulties until two years after her retirement. As a reason, she cited that she was mainly left on her own and had no support after her career. Other main issues were the loss of identity as an athlete and the decline in self-esteem.

Discussion/Conclusion: The results of this case report match with the current scientific state of knowledge. The literature suggests voluntary career end, identity, satisfaction with athletic career, social support, emotional distress, resources and transition planning as predictors of the retirement quality. Based on these findings, counselling guidelines should be developed to optimally support elite athletes after their career. The aim is to identify and support athletes who are highly likely to react with adaptation problems to the demands of career retirement and help them to better cope with this challenge.
Based on the recent experience of several editions of the Youth Olympic Games, we will explore various forms of “education” and discuss the youth engagement scale (from awareness to empowerment). New forms of “education” are needed today which transcend traditional modes of “downloading” knowledge into young people’s brains. The nature of the target (young elite athletes of various age groups from different cultural backgrounds) and a packed agenda at Games-time make the task of the organisers very complex. Digital technologies, peer-to-peer learning, gamification, role models and other tools will be discussed. The example of the IOC Young Leaders programme (born out of the Youth Olympic Games) will be presented as such programme of social entrepreneurship through sport is the ultimate way of educating young talents with leadership skills and preparing the next generation of sports leaders.
Preventing doping in sport: what can we learn from elite cycling?

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The Olympic movement has been increasingly concerned with doping prevention over the last two decades. Detection and prevention methods and strategies are mentioned in WADA’s 2015-2019 strategic plan (pp. 3 &17). Doping prevention relies on two main pillars. First, it relies on detection as a deterrence tool, which is predominantly based on the clarification of anti-doping rules, and the development of testing and investigation. Second, it relies on education, that can be inspired by preventive approaches implemented in other established social domains such as social drug use (Backhouse, Patterson, &McKenna, 2012). However, anti-doping prevention still often looks like a crusade which is intended to change or control athlete’s morality. Yet, these two pillars are far from being balanced. In this presentation we would like to emphasize and support another approach of prevention based on empirical observation of athlete’s behaviours. We will use our observations on elite riders’ attitudes towards doping (Fincoeur, Cunningham, &Ohl, 2018)to tailor prevention strategies that are adapted to the characteristics of the target population.


Is education a priority for anti-doping stakeholders?

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In our communication we would like to underline the ambivalent attitudes of the anti-doping organizations and the Olympic movement toward education. On one hand, doping prevention, in most of the cases assimilated to education, is staged as a priority. On the other, the investments in antidoping education and the real place given to antidoping education are not the priority. It can be both observed in the WADA code and in the low financial support to anti-doping education, decreasing under 3% of the organization expenses in anti-doping (ASOIF, 2016).

How to explain such ambivalence? Is education a real concern for the Olympic movement? Is it just a hypocrite social performance that is needed to show that the Olympic movement is concerned? Is it due to the difficulties to implement efficient education programmes? Is anti-doping education a “team performance” (Goffman, 1967) played by sport organizations that are willing to show their concern on education? We will argue that the ambivalent place of education is due to a combination of two factors. First, the uncertainty of the outcome of prevention programmes. Their long-term impact is uncertain and very difficult to assess. The second factor is due to a very strong “doxa” that feeds the belief that sport is inherently educational. This contribution will argue that changing athletes’ mentality is not efficient without changes in the environment in which the athletes train and perform.
Israel’s potential of using the Winter Olympic Games and of the Youth Olympic Games for nation branding and public diplomacy

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Israel’s ability to use sports for nation branding and public diplomacy is limited by international politics. Israel’s participation in the summer Olympic Games is much associated with political incidents, boycotts and especially the 1972 Munich Massacre – the terror attack in the 1972 Munich Olympic Games. The Youth Olympic Games and the Winter Olympic Games embody opportunities for Israel, that the country cannot necessarily find in the summer Olympic Games. Israeli athletes have been successful in the Youth Olympic Games winning more gold medals than in over 60 years of participation in the summer Olympic Games. Because of the smaller size of the games, Israel can also aspire to host the Youth Olympic Games or at least the European Youth Olympic Festival. Israel has been participating in the Winter Olympic Games since 1994. Most of the athletes who represented Israel were born in ex-Soviet Union countries or in the United States. Thus, there is a very different narrative of national identity and a different reflection to the image Israel through participation in the Games. Through this presentation I analyze the opportunities and challenges for Israel to use the Youth Olympic Games and the Winter Olympic Games for nation branding and public diplomacy purposes.
Objective of present study was to evaluate the effects of small-sided recreational basketball on maximum oxygen uptake, body composition, blood pressure and resting heart rate in untrained male and to examine relationship between maximal oxygen uptake and body fat percent. Two groups were formed; intervention and control with 12 participants in each. A supervised recreational basketball was offered to participants in intervention group for 12 weeks. All games were played on half court and on 3 a side basis 2 times per week. Heart rate of all participants were measured during basketball sessions. Independent T test have shown mixed results with regard to physical parameters after twelve weeks of basketball. There was significant difference seen between two groups in body fat (t20 = 2.417, P = 0.026), VO2max (t20 = 2.144, P = 0.046) and resting heart rate (t20 = 2.183, P = 0.043). No significant difference was seen in body mass (t20 = 1.759, P = 0.097), BMI (t20 = 1.775, P = 0.095), lean body mass (t20 = 0.292, P = 0.773), systolic blood pressure (t20 = -1.389, P = 0.180) and diastolic blood pressure (t20 = -1.712, P = 0.107). Significant relationship was seen between VO2max and body fat in intervention group (r = 0.049). Probably for first time recreational basketball carried on half court, on half hourly basis and only for two days in week have shown significant improvement in VO2max of untrained males along with reduction in body fat and resting heart rate.
The fatigue-induced alteration in postural control is larger in hypobaric than in normobaric hypoxia

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**Purpose:** To test the hypothesis that postural control would be more affected by plantar flexors fatigue during acute exposure in hypobaric (HH) than in normobaric (NH) hypoxia or normobaric normoxia (NN). **Methods:** Twelve young male adults performed in a random order three experimental sessions (in HH and NH (\(F_iO_2 0.139\)) at an altitude of 2950 m, and in NN at 500 m) composed of a bipedal postural control with eyes open on a posturographic platform before and after a plantar flexors exercise protocol. Center of pressure (CoP) trajectory and stabilogramm diffusion analyses (SDA) parameters were assessed. A two-way repeated measures analysis of variance was used to identify differences by examination of the group and time interaction. **Results:** Surface of CoP trajectory analysis, increased at POST in HH (\(p<0.001\)) and in NH (\(p<0.01\)) compared to NN. SDA confirmed that PC was more altered in HH than in NH (\(p<0.001\)) and NN (\(p<0.05\)) at POST. **Conclusion:** The plantar flexor fatigue-induced alteration in postural control increased to a larger extent in HH than in NH or NN, suggesting an alleviating influence of the decreased barometric pressure *per se* and a mechanical influence of the higher breathing frequency in HH.
The effect of preferred and imposed music on physiological and psychological responses during passive recovery from intense exercise

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Recently studies demonstrated the essential role of music as a psychological ergogenic aid in improving exercise performance during and after exercise sessions. It can reduce muscular and mental tension and decreases sympathetic stimulation and sustains motivation to resist mental and emotional fatigue. It has been used in various interventions to enhance performance and influence recovery. The aim of the study was to determine the effect of music on certain psychological and physiological variables during passive recovery from intense exercise. Sixteen healthy male college students participated in this study (Age 20.7 ±0.6yrs; Height: 174± 8.3 cm; Body mass: 66.6± 8.9 kg; BMI: 21.98± 2.7kg/m²). All participants performed time to exhaustion test at maximal aerobic speed. Blood lactate, heart rate, rating of perceived exertion and feeling score were measured before exercise and at the end of 20m of passive recovery in two conditions either listening to preferred or imposed music in randomized order. Results showed that listening to music had no effect on heart rate, lactic acid and feeling score during the recovery. However, it had impact on rating of perceived exertion (P≤ 0.05).In conclusion the present study recommended conducting a similar study with the need to observe the circumstances surrounding the experiment and to determine the type of music.
FLOW-PERFORMANCE ANALYSIS OF YOUTH INDIAN UNIVERSITY HOCKEY TEAMS

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ABSTRACT
The purpose of the study was to analysis flow state and performance among the youth indian university field hockey teams. Four youth indian university field hockey teams (N=64) placed first four spots in the south zone all india interuniversity tournament were taken as the subjects of this study. Dispositional flow state scale-2 (DFS-2) (Jackson and Eklund, 2004) was administered. Descriptive statistics and ANOVA were used to analyze the data. Results shows that highly performed teams had high flow score. The mean flow score of winner was the highest (M=3.82) and the runners up scored the second highest mean flow score (M=3.73) followed by the third (3.70) and fourth (3.53). Statistically significant differences were found between the youth Indian university teams in flowstates. Result of this study clearly indicates a positive relationship between flow states and performances among the youth indian university field hockey teams.
What makes mega-events sustainable? Comparing Olympics, World Cups and Expos since 1960

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Mega-events such as the Olympic Games are often presented as sustainable policies for cities, regions and countries to boost economic growth, revamp the host’s image, attract tourists and develop infrastructure. Using a multi-dimensional definition of sustainability comprising economic, social and ecological indicators, this paper analyses unprecedented comparative evidence across 53 mega-events since 1960, covering the Summer and Winter Olympic Games, Football World Cups and Expos. It shows that sustainability outcomes vary considerably between events and proposes a ranking that distinguishes between more and less sustainable events. Through regression analysis, it establishes predictors of sustainability, both at the macro level (economic and political system, population size, corruption, wealth), at the organisational level (governance model, cost, event size, event type) and at the urban level (concentration, construction, location). The evidence shows that there is not one ‘model’ of sustainable games, but different experiences varying across a plethora of hosts that need to be discussed separately.
Athletes as Ambassadors of Diplomacy and Olympism: Realization of the Olympic Philosophy in PyeongChang 2018

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As the Olympic Games aim to demonstrate how sport can contribute to building a better world, PyeongChang’s vision for the 2018 Winter Olympic Games (WOG) was to offer the Olympic Movement a legacy of new growth never seen before. In practice, the 2018 WOG proved to be a benchmarking example serving as a cornerstone to promoting peace and reconciliation, by bringing together the world in harmony transcending the differences of race, color, gender, sexual orientation, religion or political opinion. This article examines the Olympic athletes as ambassadors of diplomacy through a content analysis of authentic cases which were published in the media around the world during the 2018 WOG in PyeongChang. For example, the most symbolic moment of these Games was when the South Korean and North Korean Olympic delegations marched together as one team, with the Korean unification flag, during the parade of nations at the Opening Ceremony. However, negative examples, which are an inseparable part of the Olympic Games, should not undermine the validity of Olympism values as reflecting cosmopolitanism. In effect, ideals have never been completely achieved, as there are always compromises. Therefore, Olympians, who serve as role models to the rest of society, must find the most positive association possible with the Olympic Games. In this way they can advance sport as more than a modern sporting competition, but also a set of values that extend well beyond the playing field.
A growing number of studies on the representation of women in sport governance have been conducted in recent years. Studies mainly focus on a specific country, such as the Netherlands (Claringbould & Knoppers, 2008, 2012), Germany (Pfister & Radtke, 2009), or Scandinavian countries (Hovden, 2010, 2012; Ottesen, et al., 2010). Studies analysing international sport organisations remain rare and international sports federations (IFs) remain a “black box” regarding this issue. To fill this gap in the literature, we have conducted a study that proposes an overview of the current women’s participation in the decision-making bodies of winter and summer Olympics IFs. It first uses a quantitative approach: it gathers evidence on IFs’ board composition as well as on the IFs’ leadership duo president/director general. In a second step, we have conducted an exploratory study at the International Cycling Union (UCI), consisting of 12 semi-structured interviews: six with women and six with men from different hierarchical levels (president, directors, heads/chiefs of department, managers, coordinators). Our results show that despite a positive evolution in general, women holding leadership positions in the governance of key sport organizations remain an exception. The study further suggests that the gender orientation of a sport, the history of the federation’s structuration as well as the formal gender policies implemented by the organizations impact the gender ratio at governance level. Using these findings, we conclude that female sport leaders at the international level continue to struggle in terms of overall representation and access to leadership positions.
Television broadcasting: "Tanned" do not ski Media representations of African and South American athletes during Albertville 1992 Olympic Games

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Looking at all the media (press, radio, television, advertising, Internet...) and immediately we note the importance of sports speeches, and their diversity. In the big world of sport, the Olympic Games are a figure apart and very complex. First, two major types can be distinguished (Winter and Summer). On this paper, our interest will be on Winter Games, and the very last edition in France (Albertville 1992). The theoretical basis of this work will be the (critical) discourse analysis. This study proposes to highlight the issue of nomination with that of athletes taking part in the competition for African or South American countries. Coming from regions not traditionally oriented towards winter sports and having results far from the top of the ranking, we will be interested in the representation of its participants. Often described as losers in advance or symbols of an Olympic ideal (participation taking precedence over victory)... what are the Olympic values supposedly mediated here? How does it match with the official discourse of the official Olympic bodies? After a presentation of the modes of selection and participation of the athletes, we will try to see what ideological principles or at least what discourses are distinguished or dissimulated jointly. Based on the audio-visual material of the INAthèque, we will analyze two television documentaries and selective remarks recorded during competitions (the data come from French television only).
The long-term implications of mega-events for the provision of accessible public spaces

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This paper combines the work of two academics who have investigated the relationship between mega-events and urban public spaces. The particular focus here is the long-term significance of hosting mega-events for the provision of accessible urban public space. The authors’ previous studies — including analyses of Olympic Games (Osborn & Smith, 2016; Smith, 2016; McGillivray, Duignan & Meikle, 2019), Commonwealth Games (McGillivray, 2019) and other mega-scale events — have shown that events can reconfigure public spaces in a number of obvious and more subtle ways. Mega-events can be used as experiments to test new ways of controlling public space or as ‘Trojan Horses’ which allow new systems to be introduced under the convenient cover of a mega-event. The paper also emphasises how mega-events are used to transform regular public spaces into events-oriented sites. This is achieved via the normalisation of hosting and because mega-events — which are often justified as exceptional, or one-off occasions — provide high profile precedents which are used to sanction future events (Smith, 2014). The supposed success of a mega-event is also used as a mandate to shift public spaces towards a more commercial orientation. The paper adopts a critical perspective, but one that allows for the acknowledgment of more positive legacies. For example, the authors show how mega-events result in innovative ways of using public space (Smith, 2018). Highlighting these ‘potentialities’ can influence the ways spaces are designed and managed on a more permanent basis.
IOC presidents and the olympic youth, from Pierre de Coubertin to Thomas Bach

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Youth is at the core of olympism from Pierre de Coubertin’s messages to « la jeunesse de toutes les nations » to the current Youth Olympic Games official discourses. Firstly they speak about the youth as if this broad category does exist when so many different youths populate the world. Secondly, since Coubertin, every IOC presidents have assigned aims and tasks to this so-called youth. As cultural sociologists and historians have demonstrated, general speeches about youth provide more information on the ones who produce the message than on the ones who are involved in. In other words olympic speeches about youth give us information on the IOC presidents’ social and political thinking and background.

This presentation will consider the successive olympic youths imagined by IOC presidents within their own historical contexts: de Coubertin’s and de Baillet-Latour’s aristocratic heritage at the time of empires and fascism, Edström’s and Brundage’s conservative minds at the age of Cold war and decolonisation, Killanin’s and Samaranch’s business changeover during the post-1968 years, Rogge’s and Bach’s YOG concept in our era of globalisation. But are these successive olympic youths so different from each other?
Special Topic

The urban future of the Winter Olympics

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The Olympic Winter Games cycle started in Chamonix in 1924 and was organised until 1960 in mountain resorts. From Innsbruck 1964, the Winter Games were mostly held in medium sized cities close to the mountains. From Nagano 1998, they have been organised in large cities away from the slopes. The next Olympic Winter Games will be held in Beijing, China in 2022 and Milano, Italy in 2026. Where should the 2030 Olympic Winter Games, as well as the 2024 Youth Winter Games, take place? The question is relevant not only to the potential cities and communities but also to the IOC (International Olympic Committee) as it now wants to invite potential territories to bid rather than organise a candidature process which in the past has been prone to non-strategic choices and hurting corruption in the past. The future “winter invitations” should consider issues such as climate change, the increasing need of accommodation, the decreasing interest of young people for traditional (Winter) sports, and the expected festival atmosphere around the event. All these issues affect first and foremost the Olympic Winter Games, as well as the Winter Youth Olympic Games, and should be taken into consideration when inviting potential host communities. The paper shows that urban candidatures, have a better chance to host future Winter Olympics and other large-scale winter sports events than traditional winter resorts or smaller cities near the mountains. Examples in Switzerland and abroad are outlined.
The legacy of mega events: urban transformations and social citizenship in Rio de Janeiro

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Mega-events have lasting effects on urban fabrics beyond their duration. While capital investment and media/public attention are high, these long-lasting effects are often underreported. In order to more comprehensively investigate these social, political and economic transformations, their effects on the ground should be analyzed under a perspective of actors and policies and effects on social citizenship in areas more affected by such alterations. This localized analysis facilitates transnational comparative approaches.

With the project “Urban regimes and citizenship: case-study for innovative approach”, carried out in Rio de Janeiro, we scrutinized the link between impact of mega-events, actors planning this process and implication on social citizenship, including educational perspective.

This metropolis was a formidable setting of process of urban transformation having mega-events as engine, featured by a substantial failure in term of shared benefits for the population, not only for economic aspect, but also failing in strengthening the social and political scenarios. Beside sound gains for a restricted élite, this process generated a wide relapse on the collectivity, especially in some areas, worsening the democratic life of the city and further hampering the possibility to feed a virtuous relation of participation, of political constructive debate. Seems then to reckon a clear separation between provisions of the city and the possibility to create a route of entitlement for its collectivity. This separation is surely a problem, but has the value to pose the question of what social citizenship means in term of entitlement and provision and how to help enabling a substantial citizenship.
Should we invite young athletes to blow the whistle?

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Both the International Ski Federation and the International Biathlon Union are among the latest international sport federations to have implemented a reporting mechanism inviting athletes to report doping issues, or any violation of internal regulations. Considering the sensitivities of the whistleblowing process, and the fate of notorious sport whistleblowers, young athletes using these reporting mechanisms could be exposed to negative consequences for their career and personal situation. Should we therefore invite youngsters to blow the whistle? This article will first of all evaluate the quality of the reporting mechanisms and whistleblowing policies implemented by the two winter sports federations, to assess the extent to which they could be reliable and trustworthy for young athletes. It will then discuss the legal and moral responsibilities that need to be taken into account by sports organisations who are proposing vulnerable populations to become whistleblowers.
Cut yourself some slack: self-compassion does not impair self-improvement motivation

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How people relate to themselves is important for their well-being. While treating oneself compassionately is beneficial for mental health, treating oneself with harsh self-criticism has detrimental effects. However, some athletes believe that being too compassionate to oneself leads to mediocrity and self-criticism is necessary to keep improving. The aim of this research was to investigate how two styles of self-relation (i.e., self-compassion & self-critical) were associated with self-improvement motivation and goal orientation. A sample of 66 young winter sport athletes (M<sub>age</sub> = 17.3, SD = 1.4; 72% male; sports: hockey (35%), alpine skiing (28%), cross-country skiing & biathlon (31%), snowboard freestyle (6%); M<sub>weekly training hours</sub> = 15.3, SD = 3.7) completed questionnaires assessing style of self-relation, self-improvement motivation and goal orientation. Results show that neither a self-compassionate nor a self-critical style to relate to oneself correlated with self-improvement motivation (r < .14, p > .05). Self-compassion was associated with more task orientation (r = .26, p < .05) and self-critic was associated with increased seeking validation from others (r = .46, p < .05). Helping athletes to be more self-compassionate and less self-critical should therefore not impair their self-improvement motivation, but could be a way to shift their focus from an external to an individual reference system to validate themselves. We conclude that in competitive sport settings self-compassion is a way to increase well-being without compromising athletes’ crucial motivation to improve.
To date, some studies have referred to the strategic management of businesses as a means to analyse the competitive advantage of nations in sports competitions (e.g., Robinson & Minikin, 2012; Truyens, De Bosscher, Heyndels, & Westerbeek, 2014). These studies tend to adopt the resource-based view (RBV), which is commonly applied in management when investigating specific resources and capabilities that create a competitive advantage of a business firm. Researchers in mainstream economics have argued that firms should combine the RBV with an external analysis from a market-based view (MBV) to build a sustainable superior performance (Hooley, Piercy, Nicoulaud, & Rudd, 2017; Porter, 2008). Only recently, researchers adapted a MBV to explain the competitive advantage of nations in sports (e.g., Truyens, 2016; Weber, De Bosscher, & Kempf, 2019).

A MBV is particularly relevant at the Winter Olympics, because the number of Olympic sports and disciplines added by the International Olympic Committee (IOC) increased over the last three decades, and meanwhile the number of competing and medal-winning nations expanded (Chappelet, 2002, 2014; Weber, 2019).

Given the evidence on the ongoing global sporting arms race between nations (De Bosscher, Shibli, Westerbeek, & Van Bottenburg, 2015), this session outlines the challenges for competitive winter sports nations to secure a sustainable competitive advantage over their rivals. A Swiss round table on to use of the Lausanne 2020 YOG to align the Swiss elite sport system for 2030ff is organized. Following, an international round table is staged to discuss the consequences outlined above.
TRAINING LOAD CHARACTERISTICS IN THE CONTEXT OF INJURY AND ILLNESS RISK IDENTIFICATION IN ELITE YOUTH SKI RACING: A PROSPECTIVE STUDY

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KEY WORDS: injury, illness, risk factors, training load, youth ski racing

Alpine ski racing is a sport with a high risk of injury. Training load characteristics, however, have not been investigated with respect to injury and illness risk, even though studies in other sports reported significant correlations among these aspects. Therefore, the aim of the present study was to assess the role of training load characteristics in injury and illness risk identification.

Training load characteristics, as well as traumatic injuries (TI), overuse injuries (OI) and illnesses (IL) of 91 elite youth ski racers (52 males, 39 females; 10.0-14.4 years) were prospectively recorded over one season. Linear regression analyses were performed (dependent variables: illnesses, injuries; independent variables: weekly training volume and intensity, acute:chronic work load). Level of significance was set at p<0.05.

A total of 666 training sessions were analyzed (311 athletic, 355 skiing). In total, 185 medical problems were reported: 41 TI (0.46 TI/athlete), 12 OI (0.13/athlete) and 132 IL (1.47/athlete). Most injuries affected the knee (TI: 31.7%; OI: 25%). Most IL affected the gastrointestinal (48.5%) or respiratory tracts (40.2%). Weekly training volume, intensity and workload did not represent significant injury risk factors. Weekly training intensity was a significant risk factor for IL (β=0.348; p=0.044; R²=0.121).

Training load characteristics seem to not influence injury risk in youth ski racers. However, the low rates of injuries have to be considered when interpreting these results. High weekly training intensities seem to affect the immune system of the athletes. Thus, a focus should be placed on regeneration in periods of high training load.
EFFECT OF AEROBIC TRAINING IN INCREASING FREE FATTY ACIDS FOR FEMALE OVERWEIGHT

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ABSTRACT
The purpose of this study was to compare between continuous aerobic training low intensity and moderate intensity in increasing free fatty acids for female overweight. Methods: this study was conducted at 30 females overweight with mean age 19.3 years old and Body Mass Index (BMI) between 25-30 kg/m². The subjects were divided into 2 groups and given continuous aerobic training with low intensity (Group 1/CATLI) and moderate intensity (Group 2/CATMI) for 4x/week during 5 weeks. Group 1 exercised for 30 minutes continuous aerobic training using ergo cycle with 60 - 70% and Group 2 with 70 - 80% of maximum heart rate. During exercising heart rate was monitor by using Polar Heart Rate Monitor. Free fatty acids were measured before (pretest) and after (posttest) exercising. Data was analyzed using pair t test. Results: there was a significant effect of CATLI and CATMI in increasing free fatty acids with p< 0.05. Conclusion: continuous aerobic training with low n moderate intensity can be used to increase free fatty acids for female overweight.

Key words: continuous aerobic training, low intensity, moderate intensity, free fatty acids, overweight
The perception of anti-doping education among international youth athletes

Gatterer, K.

**Background:** According to the WADA Code 2015, all athletes should receive anti-doping information and education. This appears to be especially important for adolescent athletes at the beginning of their athletic career, as they are the future of elite sport. However, we currently lack knowledge what kind of anti-doping education young athletes receive and how they perceive it. Thus, the aim of this study was to investigate whether youth athletes, aged 14 to 19, participating at major events, receive anti-doping education (in form of information and education) and how useful and trustworthy they perceive it.

**Methods:** We investigated adolescent athletes aged 14-19 participating at the 2018 Youth Olympic Games in Buenos Aires (Summer sport) and at the 2019 European Youth Olympic Festivals in Sarajevo (Winter sport) and Baku (Summer sport). Data was collected via an online questionnaire including items about prevention programmes the athletes receive and their thoughts about its usefulness and trustworthiness.

**Results:** Of 7,596 athletes participating in the three events, 1,690 (22.25%) engaged in the study. Their mean age was 16.49±4.19, 43.3 were male. About 30% (n=475) claim to have never received any anti-doping education with no difference between summer and winter sports. On a 5-point Likert scale, athletes rated the received education on average 4.27±1.19 and trustworthiness 4.48±0.76.

**Discussion:** It seems alarming that about 30% of professional young athletes participating at major international sport events have not received any anti-doping education. Especially in regard to unintentional doping, the strict liability rule and the increased testing during such events, a sound education should be a prerequisite for participation as athletes might otherwise not be aware of their roles and responsibilities.
Effect of age and gender on biathlon’s skiing and shooting performance

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Introduction. In Biathlon, both cross-country skiing and shooting skills participate in performance variability. Therefore, this study aimed to analyze the influence of age and gender on biathlon’s skiing and shooting performance.

Methods. Official race times and course information from international Biathlon union (IBU) Cup, World Cup, World Championships and Olympic Winter Games were extracted from the IBU website (www.biathlonworld.com) from seasons 2009-10 to 2016-17 for sprint, individual, pursuit and mass start. Skiing speeds have been calculated by subtracting penalty time for every missed shot from the final racing time. Accuracy for prone and standing shooting, were determined by dividing the number of targets by the number of hits.

Results. Evolutions of skiing speed, shooting accuracy and ranking through biathletes’ ages and gender showed significant differences. Optimal age for skiing performance (P<0.05) was 27 and 32 yo for male and female biathletes, respectively. Both prone and standing shooting precision reached greatest values (P<0.05) at 35 and 34 yo for male and female biathletes and significantly differed (P<0.05) from youngest ages (<22 and <25 yo, respectively). Peaking biathlon performances were 27 and 32 yo with significant difference (P<0.05) from youngest ages (<24 and <29 yo) for male and female biathletes, respectively.

Conclusion. Biathlon’s skiing and shooting performances appeared sharper and longer for male than female athletes, suggesting that the latest have an earlier maturation and a more constant progression. Shooting accuracy appeared less affected by age than skiing. Such findings may be helpful for long-term training-plan development.
Special Topic

DECISIVE TRANSITIONS OF WINTER SPORTS’ ATHLETES: INSIGHTS FROM SCANDINAVIA
Stiliani “Ani” Chroni1, Natalia Stambulova2, Øyvind Sandbakk3, Tonje Hinze4

1 Inland Norway University of Applied Science, Norway
2 Halmstad University, Sweden
3 Norwegian University of Science and Technology, Norwegian Top Sport Centre, Norway
4 Norwegian Top Sport Centre, Norway

Session Overview

In this session, the speakers will adopt a scientist-practitioner perspective to address a range of athletes’ decisive transitions. First, an overview of how athletic careers are approached in Scandinavia will be offered with particular focus on transitions that appear to challenge one’s career. Second, the junior-to-senior transition in Swedish ice hockey will be discussed based on a four-phase empirical model grounded in individual and focus groups interviews. Third, new research evidence will be presented focusing on the elite winter sport athlete-to-coach transition in Norway based on in-depth interviews with recently transited coaches and federation officials and an empirical model reflecting unique features of this transition. Fourth, practical experiences will be shared from working with Norwegian dual career athletes in preparation for athletic retirement. The presentations will be followed with a moderated discussion focusing on career support that is essential for helping athletes to develop healthy, successful, long-lasting careers in sport as well as to transit to life after sport.

Transitions as Turning Phases in Winter Sports Athletes’ Careers: An introduction
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Norwegian University of Science and Technology | Norwegian Olympic Sport Center, Norway

Scandinavian countries’ success in winter sports is largely based on their care for athlete development and the athletes as whole persons and throughout their careers. Special attention is given to athlete preparation for, and support during, the career as well as in decisive career transition phases they face. The junior-to-senior athlete transition is considered as the most challenging one that often turns into a dual career transition; i.e., towards higher levels in sport and education – both of which require solid coping resources and external support. Another decisive athletic career transition is that of retirement and adaptation to the post-sport life, especially after a career in the elites. However, not all retiring athletes leave sport, some stay in sport as coaches and while this transition is a very common one, it is one that only recently attracted researchers’ attention. Last but not least, the transition to life after sport whether inside or outside sport is a concern long before the end nears, and dual career programs are in place to facilitate and support athlete transitions. These topics will be introduced with a focus on what is essential for helping athletes to develop healthy, successful, long-lasting careers in sport as well as to transit to life after sport.

Transitioning from Junior to Senior: Lessons Learned from Swedish ice-hockey
Natalia Stambulova
Halmstad University, Sweden

Ice-hockey is among the most popular sports in Sweden, and the teams are structured in three national (professional and semi-professional) leagues and regional divisions. This two-stage study supported by the Swedish Ice-Hockey Association focused on the players’ junior-to-senior transition (JST) to provide insights
for psychological support in this decisive transition and to supply novel material for coach and player education. During the first stage seven semi-professional players situated at different moments of their JST were interviewed about their transition experiences, and the data treatment resulted in the empirical model “Phases in the JST of Swedish ice-hockey players”. During the second stage the empirical model was validated based on critical reflections of 15 professional players and expert coaches through focus groups and individual interviews. The validated model described the JST as having four phases – preparation (17-20 years old; still in juniors), orientation (first season in seniors), adaptation (second-third seasons in seniors), and stabilization (third-fourth seasons) with specific demands, resources, barriers, coping strategies, and outcomes for each phase. The model revealed that psychological support to the transitional players might be more efficient if to take in account the specific features of the JST phases.

**Transitioning from elite athlete-to-coach: Lessons learned from Norwegian winter sports**

Stiliani “Ani” Chroni

*Inland Norway University of Applied Science, Norway*

Hiring retired elite athletes as coaches is common practice worldwide that reinforces athletic experience as an important element of coaching. Nevertheless, coaching is complex, requiring specialized knowledge across multiple domains and the athlete-to-coach transition is not as straightforward is often viewed from the outside. In the initial phase of this work we scrutinized the experiences of six Norwegian early career coaches after elite careers in winter ski sports. Following, we interview ten federation officials who had been involved with the recruitment and hiring of athletes as coaches. To this day, we have identified some critical points in the themes of exiting the athletic career, entering coaching, the ‘no longer and not yet’ in the transition, as well as challenges and facilitators. Further on we built a three-phase empirical model, the Athlete-to-Coach Transition Journey Model encompassed of the career shift, re-identification and professional development phases. On a practical level, the new research evidence can better prepare and support athletes transiting to coaching (and the organizations employing them) if we consider the demands, barriers, and resources characterizing each phase. In addition, it can inform coach education and development programs for the particular experiences of those transiting into coaching after a career in the elites, while it challenges some fast-tracking traditions.

**Transitioning out of sport: The dual career support to Norway’s elite athletes**

Tonje Hinze

*Norwegian Olympic Sport Center, Norway*

One of the most decisive athletic career transitions is that of retirement and adaptation to the post-sport life, especially after a professional elite sport career. Various factors influence athletes’ transition to life after sport (e.g., voluntarily/involuntarily retirement, degree of preparations, level of athletic identity, external support) while each athlete experiences the transition differently. In Norway, majority of elite athletes will not earn sufficient income during the professional athletic career to be financially independent when retiring from sport. Consequently, the athletes need to prepare for life after sport while they are still competing, so that they are employable and attractive to the labor market when retiring from sport. Practical experiences from the dual career work delivered at the Norwegian Olympic Sport Center will be presented with special emphasis on the “Next Step” program that is designed to help athletes succeed in their post-sport careers. The program is designed to cultivate intrinsic knowledge in elite athletes and enhance unique and robust understanding of their transferrable skills.
Special Topic

National elite sport strategies to increase Olympic medal success 2030ff: How to use the YOG?

To date, some studies have referred to the strategic management of businesses as a means to analyse the competitive advantage of nations in sports competitions (e.g., Robinson & Minikin, 2012; Truyens, De Bosscher, Heyndels, & Westerbeek, 2014). These studies tend to adopt the resource-based view (RBV), which is commonly applied in management when investigating specific resources and capabilities that create a competitive advantage of a business firm. Researchers in mainstream economics have argued that firms should combine the RBV with an external analysis from a market-based view (MBV) to build a sustainable superior performance (Hooley, Piercy, Nicoulaud, & Rudd, 2017; Porter, 2008). Only recently, researchers adapted a MBV to explain the competitive advantage of nations in sports (e.g., Truyens, 2016; Weber, De Bosscher, & Kempf, 2019).

A MBV is particularly relevant at the Winter Olympics, because the number of Olympic sports and disciplines added by the International Olympic Committee (IOC) increased over the last three decades, and meanwhile the number of competing and medal-winning nations expanded (Chappelet, 2002, 2014; Weber, 2019).

Given the evidence on the ongoing global sporting arms race between nations (De Bosscher, Shibli, Westerbeek, & Van Bottenburg, 2015), this session outlines the challenges for competitive winter sports nations to secure a sustainable competitive advantage over their rivals.
Neuromuscular testing using force-plates and an overview of the physical preparation of competitive youth snowboarders, freeskiers and alpine skiers.

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Introduction: Assessing responses to youth athletes training and tracking their long term development is an important component of physical preparation in sport academies. Eccentric muscle actions are an integral part of alpine skiing (Berg et al 1995). In snowboarding and freeskiing, slopestyle and bigair athletes experience large eccentric braking forces landing following an aerial manoeuvre. Athletes in all three sports are also at a significant risk of suffering anterior cruciate ligament knee injuries. Accordingly, the aim of the current study was to assess the reliability of alternative variables of force-time curves of vertical jumps and isometric peak force and rate of force development (RFD) of the hamstrings. Methods: 30 academy athletes from snowboarding, freeskiing and alpine skiing participated in the study. Reliability of alternative variables of force-time curves following bilateral and unilateral countermovement jumps such as eccentric impulse and mean eccentric power were assessed (HUR force plate platform, frequency 1000Hz). The reliability of unilateral hamstring peak force, RFD and asymmetries between left and right limbs were also calculated. Coefficient of variation (CV) and intraclass correlations coefficients (ICC) will be used to assess the reliability. Results/Discussion: Measurements are currently ongoing and preliminary results and practical recommendations for testing and training will be presented at the congress. Results are expected to provide practitioners with information to potentially enhance the testing and physical preparation of academy snowboard, freeski and alpine athletes.

Reference list
