SYMPOSIUM
APPLIED EXERCISE SCIENCE

POSTER PRESENTATIONS OF CLINICAL RESEARCH

14th October 2011

Contact:
ces.uni.potsdam@googlemail.com
# TOPICS

## INTRODUCTION SPEECH

**Analysis of peroneal H-reflex: a possibility to investigate sensorimotor effects of foot orthoses?**

## I. SESSION: BIOMECHANICS

**Evaluation of the strength capacity, gait and balance in a patient 4 years after a fracture of the right foot sesamoid bone - A case report**

**Comparison of subjective pain prevalence in young athletes and non-athletes**

**Effects of six month trunk stability exercises on low back pain and jumping performance in young athletes: A controlled trial**

**Reliability of isokinetic peak torque measurements in trunk rotation in young athletes**

**Reliability of postural control and jump parameters in young athletes**

**Intra-session reliability of in-shoe plantar pressure measurements in different foot areas**

**Methodology and signal processing in centre of pressure data to analyse postural sway and equilibrium**

## II. SESSION: PERFORMANCE & THERAPY

**Quality control of the therapy process – case report**

**25-hydroxyvitamin D serum concentrations and vitamin D intake in elite canoeists and rowers**

**Estimating maximal fat oxidation rate by means of a treadmill protocol**

**Test-retest-reliability of metabolic and cardiovascular load during isokinetic strength testing of the lower limb**

**Risk factor analysis and sport specified injury prevention application of olympic training environment - a comparison between Germany and Taiwan**
Analysis of peroneal H-reflex: a possibility to investigate sensorimotor effects of foot orthoses?

Baur H, Hoffmann J, Müller J, Müller S, Cassel M, Mayer F

**Background:** Recent RCTs show therapeutic benefits of foot orthoses in a variety of lower extremity injury. The mechanisms behind occurring pain reduction are subject of debate. Mechanical aspects (alignment of the skeleton) as well as sensorimotor adaptations are discussed. The analysis of spinal adaptations might help to further understand the effectiveness of foot orthoses.

**Purpose:** The purpose of the study was therefore to analyse the H-reflex of the M. peroneus longus with and without the use of foot orthoses.

**Methods, Results:** The peroneal H-reflex was measured in 17 male subjects (age: 27±5, height: 1,74±0,09m, weight: 67±11kg) during standing posture in four randomised conditions (foot orthoses without medial arch support [O], with medial arch support [L] combined without additional weight [N], with additional 30% of body weight [Z]). EMG electrodes were placed on the peroneal muscle and a stimulation electrode was attached in the lateral Fossa poplitea above the N. fibularis communis. Recruiting curves (square impulse: 500µs, stimulation interval: 10s, increase of stimulation current: 0,2mA) were generated for each condition. Then maximal h-reflex amplitude (Hmax) and maximal M-wave (Mmax) were extracted. Hmax/Mmax-Ratio (H/M-R) served as primary outcome measure (statistics: descriptively: mean, 95%-CI; two factor ANOVA for repeated measures, α=0.05). The extra weight [Z] led to an increase of H/M-R of 30% (N: 0,101; Cl: 0,086 - 0,117 / Z: 0,133; Cl: 0,115 - 0,151) (p=0.02). The foot orthoses with arch support resulted compared to those without arch support to an increase of H/M-R of 22% (L: 0,139; Cl: 0,120 - 0,158 / O: 0,108; Cl: 0,093 - 0,124) (p=0.03). Mmax did not changed across conditions (p>0.05).
Discussion, Conclusion: The H-reflex of the M. peroneus longus is influenced by changes at the plantar surface and physiologically reasonable by extra weight leading to more pretension. An increase of peroneal H/M-R indicates an increased efferent drive leading possibly to an enhanced ankle joint stability. The methodological paradigm should be widened to more dynamic situations (walking, running) to further validate possible sensorimotor adaptation mechanisms induced by foot orthoses.

(This work was already presented at the 42. German Sports Physician Congress of the German Society for Sports Medicine & Prevention, Frankfurt, 08.10.11)
Evaluation of the strength capacity, gait and balance in a patient 4 years after a fracture of the right foot sesamoid bone - case report

Intzegianni C, Müller S, Mayer F

**Background:** Fractures of the forefoot represents the most common fractures in the foot with disabling pain related to exercise or chronic foot pain affecting balance and strength capacity of lower limb. The treatment varies from conservative to surgery depending on the location and severity of the fracture.

**Purpose:** To evaluate side difference for strength capacity, postural control and plantar pressure distribution in a 24-year-old female (height 166cm, weight 58kg) who sustained sesamoid bone fracture 4-years ago and stress fracture on the 5th metatarsal bone in the right foot 3-years before and still complaining of pain.

**Methods:** The patient underwent pedography analysis using the two-step-protocol, 3 walking trials was made in each foot. The balance was evaluated by postural control analysis, 3 repetitions were made on each leg with 5sec pre-perturbation and duration of 15sec. Strength capacity was first evaluated with isokinetic dynamometer for ankle eversion and inversion with 30°/sec (ROM 30° in each direction), and with isokinetic leg press with 0,5m/sec with stable and unstable foot plate for lower limb (ROM 20°-90°).

**Results:** The role-over process was different in the forefoot during the push-off phase between right and left. The strength capacity in injured/uninjured during ankle eversion was (17.8/15.0Nm) and inversion (17.1/16.1Nm). During extension in stable foot plate the strength capacity in injured/uninjured foot was (753.1/690.9Nm) and in unstable foot plate (682.4/625.2 Nm). The postural control analysis showed that right leg was more stable than the left leg (11.77/12.84 W[mm]).

**Conclusion:** History of forefoot fractures is not associated with lower limb muscle weakness and instability. However there was a different role-over process in the forefoot between injured/uninjured foot. This suggests further therapy such as shoe insoles with cushioning to restore the normal pressure distribution in the foot and reduce the pain.

**Keywords:** forefoot fractures – isokinetic dynamometer – pedography analysis – dynamic posturography
Comparison of subjective pain prevalence in young athletes and non-athletes

Riegels N, Müller J, Müller S, Mayer F

**Background:** Although chronic pain is associated with ageing it becomes more common in youth people. Less is known about the role of elite sports concerning subjective pain in young people.

**Purpose:** The aim of the study was to investigate pain prevalence of young athletes and young non-athletes.

**Method:** 175 non-athletes (14±1yrs; male 94) and 214 athletes (13±1 yrs; male 144; training 13,5±4,7 h/week) were interviewed whether they felt pain during the last six month. Pain localization has been marked based on stick-figure. Athletes were interviewed vocally along the survey. Non-athletes completed same questionnaire independent. Statistic was descriptive.

**Results:** 57% of non-athletes reported pain whereas 41% of athletes did. Regarding localization non-athletes reported obviously more pain (back 54% vs. 23%; foot 55% vs. 23%; arm 41% vs. 19%; knee 45% vs. 0%).

**Conclusion:** Results show that young athletes complain less frequent about pain than young non-athletes. It has to be discussed if elite sport alleviates pain. Furthermore pain experience in athletes might be different than in non-athletes. Mixed method of questionnaire and interview has to be considered critically.

**Keywords:** pain prevalence – young athletes – young non-athletes – questionnaire
Müller J, Otto C, Weber J, Müller S, Mayer F

**Background:** Six-month prevalence of low back pain in young athletes is about 20%. Exercise is evident in prevention and rehabilitation of low back pain but it is unclear if a regular 15-minute-exercise is efficient in highly trained athletes.

**Purpose:** The objective of this study was to examine the effects of trunk stability exercises on low back pain and jumping performance in young athletes.

**Methods:** A six-month controlled intervention trial was done with 140 athletes (85male/13±0.5y/50±9kg mass/14±5h training per week/13±4 competitions last season) from the elite schools of sport in Brandenburg assigned after base camp to an intervention (IG; N=43) and control (CG; N=97) group. The intervention included a progressive trunk exercise program (suggested amount: thrice a week in the warm-up-phase of normal training). At baseline and after six month subjective low back pain (LBP; six-month-prevalence; numeric rating scale) and jumping performance (Counter movement jump (CMJ); force plate; maximum peak force [Nm], PF_{abs}; maximum peak force norm body weight [Nm/kg BW], PF_{norm}; jumping height [m], JH) were assessed. Descriptive analysis was followed by two-way ANOVA to calculate effects of interaction (α=0.05).

**Results:** IG implemented the program between 1.6-2 times a week. During the six month LBP decreased (LBP_{pre}/LBP_{post}: IG: 28%/26% CG: 20%/16%) and jumping performance (pre-PF_{abs}/post-PF_{abs} IG: 1132±237Nm/1193±220Nm, CG: 1079±240Nm/1135±238Nm;JH_{pre}/JH_{post}: IG: 0.24±0.04m/0.26±0.04m, CG: 0.24±0.04m/0.26±0.04m) increased (p<0.001). There were no interaction-effects between the two groups (LBP: p=0.78; PF_{abs}: p=0.85; JH: p=0.62).

**Conclusion:** Reduction of LBP and improvement of jumping performance has to be seen as a result of normal growth and training process. Efficacy of the additional trunk stability program has to be considered critically due to low compliance of IG.

**Keywords:** intervention – low back pain – trunk stability – young athletes
Reliability of isokinetic peak torque measurements in trunk rotation in young athletes

Engel T, Kopinski S, Müller S, Mayer F

Background: High reliability of isokinetic peak torque measurements (i.e. knee, hip, trunk) is reported in various studies, using a test setup containing fixed posture. In contrast, consistency of measurements using a less fixed position during trunk rotation to assess trunk strength remains unclear.

Purpose: Determination of test-retest reliability of isokinetic peak torque measurements during trunk rotation for a new test setup.

Methods: 13 healthy athletes (2 male, 11 female; 16±2 years, 69±17 kg, 173±10 cm, 16±8 h exercise/week) underwent an identical isokinetic test on 2 occasions separated by 2 weeks. The test setup contained one isometric measurement and 3 isokinetic axial rotations (concentric/eccentric/eccentric with perturbation; 30°/sec; ROM 60°; Con-Trex Work Simulation). All tests were performed in neutral position to device and upright-seated posture with arms stretched forward (90° angle to trunk). ICC (Intraclass Correlation Coefficient, 2.1), Bland-Altman analysis (Bias±LoA) and test-retest reliability (TRV %) were calculated based on peak torques (mean of 3 highest measures out of 5 repetitions).

Results: ICC values ranged from 0.65 to 0.91 for all measures. Test-retest variability in mean varied from 8.27 to 21.30 %. Bland-Altman analysis showed a systematic bias of -10.09 to 10.83 Nm (-6.41 to 13.07 %) and LoA from ±27.07 up to ±58.07 Nm (±16.06 to ±66.06 %).

Conclusion: Whereas ICC indicated in some cases lower reliability (eccentric, left 0.65), overall results represented similar level of reliability compared to high standardized procedures of isokinetic peak torque measurements found in literature. Also test-retest variability and Bland-Altman analysis identified for some cases lower consistency of measures. However, in favour of a functional testing, this setup can be recommended as reliable method to assess peak torques during trunk rotation.

Keywords: ICC – reproducibility – repeatability - isometric
Reliability of postural control and jump parameters in young athletes

Kopinski S, Engel T, Müller S, Mayer F

**Background:** For the oscillatory Posturomed platform, as a simple method to characterize balance ability, standard values for one-legged stance or test-retest variability are only poor verified. Alternatively, standard jump tests show good intersession reliability regarding force and time parameters. However, these findings are only validated in adult subjects.

**Purpose:** To evaluate the test-retest reliability of a balance ability device and jump parameters measured on a ground reaction force plate in young athletes.

**Methods:** 13 healthy subjects (2 females, 11 males; 16±2 years; 69±17 kg; 173±10 cm; exercise/week 16±8 hrs) performed 2 testing sessions with 2 weeks between. Both times, subjects executed a one legged stance test on Posturomed platform with perturbation (3 trials/side, randomized order), whereat total displacement (mm, 15s from perturbation) was recorded. Also, jump tests (Counter Movement Jump (CMJ), Squat Jump (SJ), Drop Jump (DJ)) were performed on a force plate (3 trials/kind, randomized order), tracing force (N), time-of-flight (ms) and time-of-contact (ms, only DJ). Reliability statistics used intra-class correlation coefficient (ICC), test-retest-variability (TRV) and Bland-Altman analysis (bias, LoA).

**Results:** Reliability analysis for Posturomed resulted in: ICC 0.01-0.63, TRV 62.9±36.46 and absolute and relative Bland-Altman values of 2341±4302 mm and 35±64% (bias±LoA). For the jump parameters the ICC ranged within 0.93-0.96 (CMJ), 0.94-0.98 (SJ), 0.81-0.93 (DJ) with an average TRV of 3.61±3.33 (CMJ), 4.56±3.88 (SJ), 10.02±7.70 (DJ). Bland-Altman results of force and time were 32±113N, 9±7% (CMJ), 5±94N, 0±6% (SJ), 89±538N, 3±16% (DJ), and 110±13ms, 21±3% (CMJ), 2±15ms, 0±3% (SJ), 1±29ms, 0±9% (DJ) respectively.

**Conclusion:** Contrary to former studies Posturomed platform showed reduced reproducibility, including a high systematic error which might be caused by learning effects. However, jump measurements on ground reaction force plates approved excellent reliability.

**Key words:** balance – posture – reproducibility – adolescent
Intrasession reliability of insole in-shoe plantar pressure measurements in different foot areas

König N, Stoll A, Mayer F, Baur H

Background: Plantar pressure measurements have been established to evaluate foot function and to help developing foot orthoses. In-shoe measurements allow the collection of multiple consecutive steps and can differentiate between different plantar regions. There is only limited information about the intrasession reliability of in-shoe plantar pressure measurements.

Purpose: The aim of this investigation was to determine the reliability of two different average-steps in several foot areas.

Method: Seventeen healthy participants (27±4y, 180±8cm, 74±9kg) walked at 5km/h on a treadmill (Split 70/200 ASK, Woodway®, Weil am Rhein). A custom-made synthetic shoe was used to attach the pressure sole (Pedar®-X system, Novel®, München, 99 sensors, 100Hz) to the foot. For each subject 50 steps of the right foot were collected. Clinically relevant parameters like the peak-pressure and peak-mean-pressure (in kPa) as well as time related measures like the force-time-integral (in N*s) and pressure-time-integral (in kPa*s) were calculated. The first and last 10 (Ave10) and 20 (Ave20) steps were averaged for statistical analysis. The intrasession reliability was judged by the intraclass correlation coefficient (ICC 2.1), the test-retest-variability (TRV in %) and the Bland-Altman limits of agreement criterion.

Results: The overall correlation of the measurements is ICC > 0.90. The TRVs range from 1.3–13.7% with the midfoot area showing highest variation. For the total object the systematic error (Bias±1.96*SD) is highest for the force-time-integral (Ave10: -6.59±11.08; Ave20: -3.08±6.06). Inclusion of more steps in the average step reduces TRVs and therefore increases ICC.

Conclusion: Plantar pressure measurements reveal good intrasession reliability. Limitations are only present in the midfoot area, where inclusion of more steps increases reliability.

Keywords: foot pressure measurements – test-retest variability – pedar pressure insole
Methodology and signal processing in centre of pressure data to analyse postural control

Hamacher D, Müller S, Mayer F

**Background:** Centre of pressure (CoP) data derived by force plates serving as a quantity of postural control is a noisy signal. Three signal processing strategies (SPS) to limit noise are established: Low-pass-butterworth filtering (Butfilt), moving-average smoothing (Movag) and root mean square smoothing (RMS). However, different cut-off frequencies (Fc) and time window sizes (WSt) may affect the results.

**Purpose:** The aim was to compare different SPS to effectively reduce noise in CoP signals.

**Methods:** Eleven seconds of an 80kg disc (reference) measure and 10 subjects‘ one-legged-stand derived from a force plate (AMTI) were processed with 3 different SPS using 26 different Fc (Butfilt) or WSt (Movag/RMS). As outcome measure the displacement of CoP was calculated.

**Results:** The displacement of CoP of the disc trial added up to 1551mm. Filtering/smoothing with 50Hz/20ms reduced values down to one twentieth. A linear relationship of Fc/WSt and displacement of CoP was observed. While filtering resulted in lower values of the displacement of CoP compared to smoothed data in the disc signal, it caused higher values regarding the subject’s trial. In subjects’ data a progressive decline has been found with.

**Conclusion:** The remarkable and linear decrease from unprocessed to smoothed/filtered data of the displacement of CoP in the disc trial suggests a considerable and random existence of noise up to high frequencies. The progressive decline in subjects’ trials indicates that filtering with low Fc and smoothing with high WSt is critical. Low values in the disc trial combined with high values in the subjects’ trial of filtered CoP data show that filtering is effective to reduce random noise while keeping physiological signal information.

**Keywords:** centre of pressure – signal processing – noise – postural control
Quality control of therapy process – A case study of an instable ankle joint in a 24 year old women

Reschke A, Weber J, Mayer F

Background: Isokinetic dynamometry and dynamic posturography are frequently used to evaluate improvements in strength and postural control over the course of training interventions.

The present case report describes a woman with a chronic instable ankle joint after sesamoid bone fracture (2007) and metatarsale V stressfracture (2008). Strength and sensimotor training was implemented to reduce ankle instability and prevent recurrent ankle sprains.

Purpose: To evaluate recent therapy process and to analyze if strength and sensorimotor training led to an improved peak force production and postural control.

Methods: The subject performed an intervention of short foot muscle strength training as well as sensorimotor training two times per week for 6 weeks. In a pre/post test - setup peak force (Nm) of leg extension (5 repetitions, concentric, alternate, 0.3 m/sec., Contrex LP) as well as postural control (path amplitude in mm, 3 trials per leg for 15 seconds stance phase, eyes open on a perturbed Posturomed platform DIGIMAX) were determined. Side differences in peak torque and path amplitude were investigated.

Results: In dynamic posturography path amplitude improved in the injured side by 35,7% (927mm pre, 570mm post) and in the healthy side by (46,9%) in post test. Peak torque did not enhance in the injured leg (681 Nm pre, 641 Nm post). After questioning the patient described higher functional stability of the ankle joint during activities of daily living.

Conclusion: In the case described Posturography represents a valuable postural measurement tool controlling the quality of therapy process. Isokinetic dynamometry of the whole lower extremity does not represent a valid method to evaluate therapy process in chronic ankle instability. Consequently, improvement of postural control is considered the main therapeutic goal in chronic ankle instability.

Keywords: case report – case series – isokinetic dynamometry – dynamic posturography
Heydenreich J, Carlsohn A, Scharhag-Rosenberger F, Mayer F

**Background:** Activated vitamin D as a steroid hormone regulates vitamin D-responsive genes and influences human muscle tissue. Therefore, vitamin D is discussed to promote athletic performance. However, recent research suggests that vitamin D deficiency is widespread, although both dietary intake and cutaneous UVB-irradiation serve as plasma vitamin D sources.

**Purpose:** To analyze vitamin D intake and 25(OH)-Cholecalciferol serum concentrations of elite outdoor athletes (ATH) and moderately active controls (CON).

**Methods:** In 16 ATH (23±4 yrs; 24±2 kg/m²; training volume: 16±7 h/wk) competing in the German canoe or rowing national teams and 19 CON (25±2 yrs; 23±3 kg/m²; training volume: 8±4 h/wk) venous blood samples were taken during the summer months. 25(OH)-Cholecalciferol was analyzed using a commercial 25(OH)-Cholecalciferol ELISA test-kit (IDS, Frankfurt, Germany). Furthermore, diet was recorded using a validated 3-day dietary protocol. Dietary vitamin D intake was calculated based on the German Nutrition Database (BLS II.3) using PRODI 5.5 expert nutritional software. All data (mean±SD) were compared with German reference levels for recommended dietary intake (RDI) or plasma concentrations. To test for differences between groups, student’s t-test was used (α=0.05).

**Results:** Mean plasma 25(OH)-Cholecalciferol levels were 93.0±13.5 nmol/L for ATH and 73.5±25.7 nmol/L for CON (p=0.008), respectively. In 13% of ATH and 53% of CON plasma 25(OH)-Cholecalciferol levels were below the German reference level of 75 nmol/L. Vitamin D intake of both ATH (3.2±4.5 µg/d) and CON (3.6±4.8 µg/d) was below RDI of 5.0 µg/d, without any difference between groups (p=0.773).

**Conclusion:** Although vitamin D intake did not differ significantly between groups, vitamin D plasma levels were higher in ATH compared to CON, with less subjects being classified deficient. Higher endogenous vitamin D synthesis rates due to UVB irradiation during outdoor training may serve as an explanation.

**Keywords:** vitamin D, athletes, UV-irradiation, dietary intake, plasma concentration
Estimating maximal fat oxidation rate by means of a treadmill protocol

Otto C, Scharhag-Rosenberger F, Carlsohn A, Mayer F

**Introduction:** The aim of this pilot study was to transfer the standard procedure for testing the intensity that elicits maximal fat oxidation from cycle ergometry to treadmill. Therewith, training recommendations to enhance fat metabolism in running can be derived.

**Methods:** 5 recreational athletes (m=3, f=2; 24±3 y; 169±9 cm; 65,8±11,1 kg; IAT: 11,4±1,4 km/h) underwent a graded exercise test (start at 6 km/h, increase: 2 km/h every 3 min) to exhaustion on treadmill in the fasted state. 24 h later a specific 30 min 5 stage exercise test (Fat\textsubscript{max}-test) based on the graded exercise test followed. It started at the velocity of the lactate threshold and ended at the velocity of respiratory exchange ratio (RER) = 1.0 in the graded exercise test. The velocity was increased every 6 min by individual stages of equal size. Fat oxidation rate was measured by means of indirect calorimetry. Continuous breath by breath gas exchange data were averaged over 10 s and fat oxidation curves were fitted using third order polynomial function.

**Results:** The highest mean fat oxidation rate occurred at the third stage (0.52±0.12 g/min; 10.5±0.8 km/h) of the Fat\textsubscript{max}-test. 4 out of 5 athletes reached their individual maximal fat oxidation rate at the third stage, one athlete at the first stage. The highest fat oxidation rates ranged from 0.43 g/min to 0.74 g/min. A mean RER of 1.00±0.04 was reached at the end of fifth stage.

**Discussion:** Using test procedures estimating the intensity that elicits maximal fat oxidation in bicycle ergometry for treadmill tests seems applicable. For training recommendations endurance tests at the intensity of maximal fat oxidation rate are necessary to validate the Fat\textsubscript{max}-test results.

**Key words:** Fat metabolism – exercise testing – recreational – training recommendations
Test-retest-reliability of metabolic and cardiovascular load during isokinetic strength testing of the lower limb

Weber J, Müller J, Scharhag-Rosenberger F, Carlsohn A, Mayer F

**Background:** Isokinetic strength tests are an evident tool to quantify strength deficits in healthy and patients. The metabolic and cardiovascular load as well as the reliability of these measures during isokinetic strength testing is unknown.

**Purpose:** The aim of this study was to establish the reproducibility of metabolic and cardiovascular measures during isokinetic strength testing of the lower limb.

**Methods:** 15 healthy subjects (7 female/8 male; 28±5 years; 175±8cm; 72±9kg; maximum oxygen uptake [VO2max] 49±10 ml/min/kg) were included. Metabolic (VO2 [ml/min/kg]) and cardiovascular (heart rate [beats/min]) parameter during isokinetic test for local muscular endurance (EWF; 60sec., leg extension concentric, 0.3m/s alternate; Contrex Legpress Physiomed AG Schnaittach/Laipersdorf, Germany) were evaluated in a test-retest over a period of 14 days. For reliability, Pearson’s test-retest correlation coefficient (r), Bland-Altman analysis (Bias ± LoA) and Test-Retest-Variability (TRV) were calculated. The analysis of VO2 and heart-rate was descriptively (mean ± SD).

**Results:** The mean value for VO2 was for the test 37.4 ± 3.57 ml/min/kg and for the retest 35.4 ± 3.43 ml/min/kg. The results for heart rate were for the test 172 ± 9.9 beats/min and for the retest 170 ± 9.4 beats/min. The test-retest correlation coefficient was .875 (p< .000) for VO2 and .72 (p< .008) for heart rate. The bias for VO2 was -1.2 ml/min/kg (with an range of ± 5.23 ml/min/kg) and for heart rate -0.5 beats/min (range: ± 14.3 beats/min). The TRV was 6.0 ± 4.55% for VO2 and for heart rate 3.29 ± 2.51%.

**Conclusion:** This one minute isokinetic strength testing protocol can measure the VO2 and heart rate reliable and the load of this test is high.

**Keywords:** strength – deficits – VO2 – heart rate
Introduction: The publication of IOC Consensus Statements on pre-participation examination (PPE) and periodical health evaluation (PHE) has generated international interests on preventing injury and improving elite performance in recent years. Is a successful national sport-medicine program in Olympic training environment a crucial core-factor for national Olympic success? Various social theory based studies have claimed it, yet few empirical proofs had been found.

Purpose: The aim of this research is to identify injury risk factors in Olympic training environment and to compare athletes and their related stakeholders (coaches, medical care provides, NOC, sport federations) between Germany and Taiwan on how they handle issues with training related injury. Making the analysed results into sport specified injury-prevention program for related stakeholders.

Method: Comparison criterion developed from IOC Consensus Statements and IOC Medical Code. Social theories adapted, standardized questionnaires measuring life events, chronic stress and social support of athlete were used for data collection. German and Traditional-Chinese versions both were in print and online. Athletes and stakeholders participated in Summer and Winter Olympic Games between 1992 to 2012 were qualified for participation. Estimated sample size: 4000 (Germany: 3200, Taiwan: 800). Four elements of questionnaire (Orthopaedic/ Cardiovascular/ Medical Resources/ Lifespan Perspective) were assigned to participants according to backgrounds. Test-retest Mann-Whitney test and Kruskal-Wallis ANOVA were analyzed by SPSS statistic software.

Result: Expected results (Hypotheses): Significant differences on athletes’ sport-specified injury patterns, significant differences on questionnaire scores of medical care providers and stakeholders between two countries. Strong correlation between lower injury rate and higher supporting-resource scores.

Conclusion: There are significant differences between Germany and Taiwan in terms of injury risk factors pattern/ management in Olympic training environment. Training-related injury risk factor were sport-specifically identified. Prevention recommendation were made for stakeholders.
CES Program

Program

The main focus of the Masters and PhD program is the acquisition of research based and occupational skills for professions in the field of exercise, prevention and rehabilitation. The program is divided into clinical applications for patients as well as for recreational and high-performance athletes. Emphasis is laid on a theoretical, methodological and experimental academic education.

Program Objectives

The participants will learn the skills required for leading positions in health services and academic careers.

The aim of the Masters program is to develop an interdisciplinary approach to the practical and scientific collaboration between various health science professions.

The aim of the PhD program is to acquire the skills necessary for independent research and academic teaching.

Science and Career Orientation

The scientific curriculum encompasses the effects of physical activity in disease prevention and rehabilitation, with the focus on exercise physiology and physical therapy.

The practical education entails collaborations with hospitals, in- and out-patient rehabilitation clinics as well as with the regional Olympic Sports Center and the University where care is provided for athletes and students.

Further Information

University of Potsdam Department of Sport and Health Sciences:
www.uni-potsdam.de/dsg/index.html